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NATIONAL DAM SAFETY PROGRAM. ATTICA DAM. INVENTORY NUMBER: NY-4--ETC(U)
JUL 78 J B STETSON DACW51-78-C-0035

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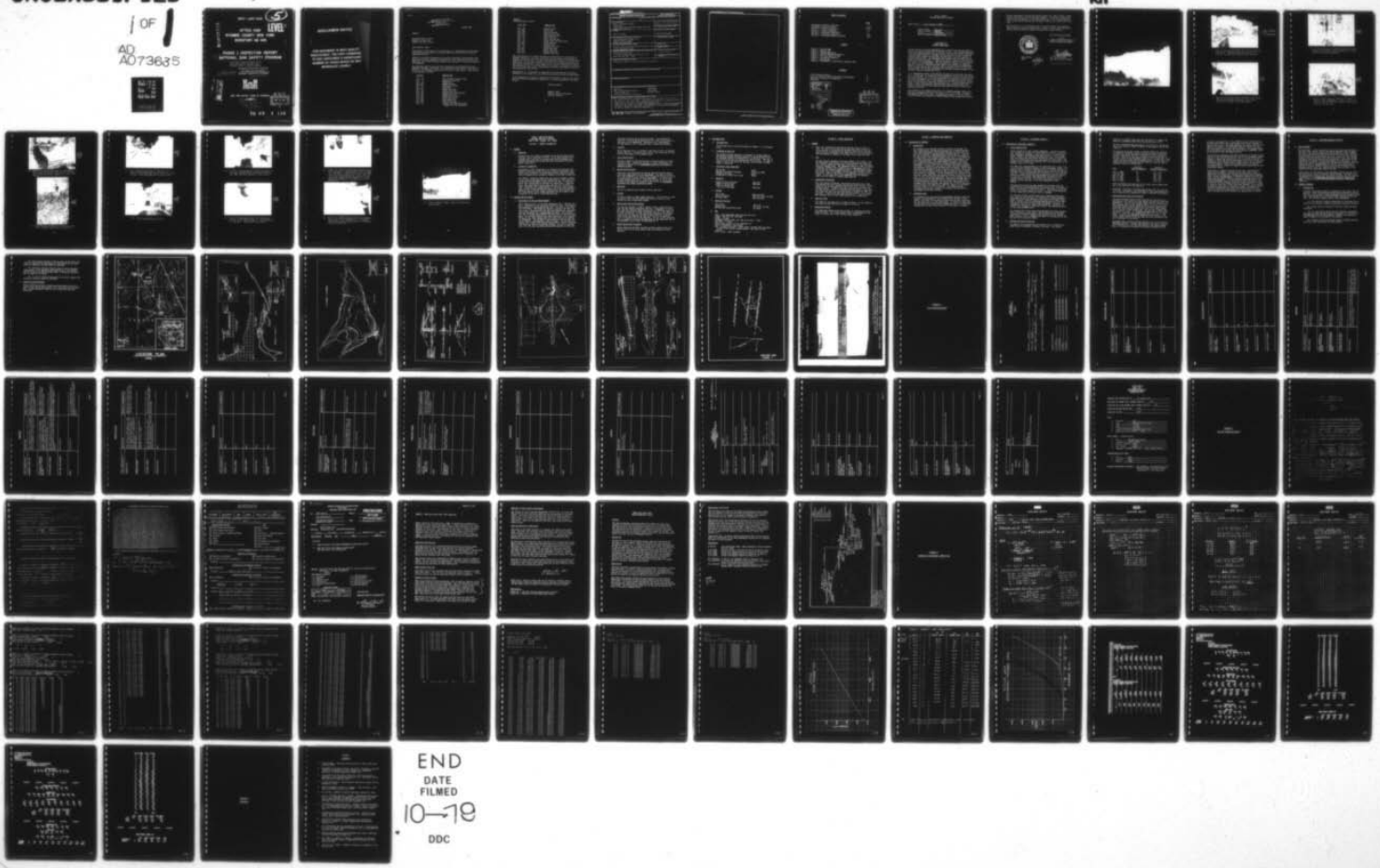

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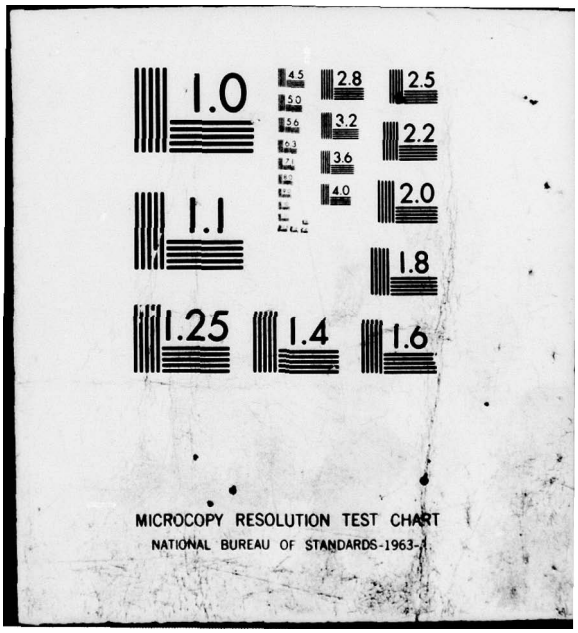
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LEVEL II

ATTICA DAM
WYOMING COUNTY NEW YORK
INVENTORY Nº 445

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM.

Attica Dam. Inventory Number: NY-445
Great Lakes Basin, Wyoming County,
New York. Phase I Inspection Report,

APPROVED FOR PUBLIC RELEASE;
DISTRIBUTION UNLIMITED

(10) John B. /Stetson

CONTRACT NO/ DACW 51-78-C-0035

(15)

NEW YORK DISTRICT CORPS OF ENGINEERS

(11) JUL 78

(12) 86 p.

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DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, NEW YORK
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10007

2 OCT 1978

NANEN-F

Honorable Hugh L. Carey
Governor of New York
Albany, New York 12224

Dear Governor Carey:

The purpose of this letter is to inform you of a clarification of the guidelines used by this office in assessing dams under the National Program of Inspection of Dams.

Office of the Chief of Engineers has recently provided a clarification that dams with seriously inadequate spillways are to be assessed as unsafe, non-emergency, until more detailed studies prove otherwise or corrective measures are completed.

The following dams in your state have previously been assessed as having seriously inadequate spillways, with capability to pass safely only the percentage of the probable maximum flood as noted in each report. They are now to be assessed as unsafe:

I.D. NO.	NAME OF DAM
N.Y. 59	Lower Warwick Reservoir Dam
N.Y. 4	Salisbury Mills Dam
N.Y. 45	Amawalk Dam
N.Y. 418	Jamesville Dam
N.Y. 685	Colliersville Dam
N.Y. 6	Delta Dam
N.Y. 421	Oneida City Dam
N.Y. 39	Croton Falls Dam
N.Y. 509	Chadwick Dam (Plattenkill)
N.Y. 66	Boyds Corner Dam
N.Y. 397	Cranberry Lake Dam
N.Y. 708	Seneca Falls Dam
N.Y. 332	Lake Sebago Dam
N.Y. 338	Indian Brook Dam
N.Y. 33	Lower(S) Wiccopee Dam (Lower Hudson W.S. for Peekskill)

NANEN-F
Honorable Hugh L. Carey

I.D. NO.	NAME OF DAM
N.Y. 49	Pocantico Dam
N.Y. 445	Attica Dam
N.Y. 658	Cork Center Dam
N.Y. 153	Jackson Creek Dam
N.Y. 172	Lake Algonquin Dam
N.Y. 318	Sixth Lake Dam
N.Y. 13	Butlet Storage Dam
N.Y. 90	Putnam Lake (Bog Brook Dam)
N.Y. 166	Pecks Lake Dam
N.Y. 674	Bradford Dam
N.Y. 75	Sturgeon Pool Dam
N.Y. 414	Skaneateles Dam
N.Y. 155	Indian Lake Dam
N.Y. 472	Newton Falls Dam
N.Y. 362	Buckhorn Lake Dam

The classification of "unsafe" applied to a dam because of a seriously inadequate spillway is not meant to connote the same degree of emergency as would be associated with an "unsafe" classification applied for a structural deficiency. It does mean, however, that based on an initial screening, and preliminary computations, there appears to be a serious deficiency in spillway capacity so that if a severe storm were to occur, overtopping and failure of the dam would take place, significantly increasing the hazard to loss of life downstream from the dam.

Consequently, it is advisable to implement the recommendations previously furnished in the reports for the above-mentioned dams as soon as practicable.

It is requested that owners of these dams be furnished a copy of this letter and that copies be permanently appended to all reports previously furnished to you.

Sincerely yours,

CLARK H. BENN
Colonel, Corps of Engineers
District Engineer

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
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7. AUTHOR(s) John B. Stetson		8. CONTRACT OR GRANT NUMBER(s) DACW-51-78-C-0035
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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

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Visual Inspection
Hydrology, Structural Stability
Attica Dam
Crow Creek
Wyoming County

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.
Attica Dam was found to be Unsafe, Non-Emergency due to a seriously inadequate spillway. Additional evaluation and monitoring of the dam was recommended as well as removal of trees and vegetation.

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PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam Attica Dam No. 3 NY445

State Located New York
County Located Wyoming
Stream Crow Creek
Date of Inspection June 15, 1978

ASSESSMENT OF GENERAL CONDITIONS

The Attica Dam is an earth embankment with a concrete core and has been in service for almost 50 years and is showing its age. The structure apparently lacks continued maintenance and repair work. The spillway concrete wing wall is severly deteriorated, a spillway side concrete wall is out of plumb deflecting inward towards the spillway, and the outlet structure concrete is severely deteriorated. The embankment and abutment areas are heavily overgrown with trees and brush. A large willow tree is growing in the front center section of the embankment. The north abutment junction with the embankment and toe of the embankment exhibit wetness, and seepage is suspected, however no erosion or piping has been noted. The spillway slab immediately below the ogee section has a cavity at the construction joint and the slab section seems to be hollow underneath the slab where foundation material has probably piped out through the cavity.

It is recommended further investigations be made of the dam after the reservoir is drawn down for inspection and the embankment sections are cleared and trees are removed. Prior to these investigations it may be required to monitor the actual behavior of the structure with instrumentation in the form of weirs and piezometers and to take readings and evaluate periodically the behavior of the structure under the supervision of a licensed professional engineer. These investigations should include items discussed herein but should include any additional necessary work observed during further investigation activities.

The spillway is not capable of passing a 1/2 Probable Maximum Flood and is seriously inadequate (according to criteria in ETL 1110-2-234). The dam is overtopped by more than a foot. The hydrologic aspects of the dam should also be further investigated and Probable Maximum Flood computations refined.

Further hydrologic investigations should analyze the runoff factors, stage-storage relationship, and the spillway capacity. Alternative remedial measures to provide capacity to spillway capacity for a 1/2 Probable Maximum Flood could include widening the spillway or lowering the normal pool elevation.

The structure is in a seismically active area and further investigations should define the seismic implications. Further investigations should provide an overall stability analysis including the seismic aspects.

Dale Engineering Company

John B. Stetson, President

Approved By:
Date: 28 July 78

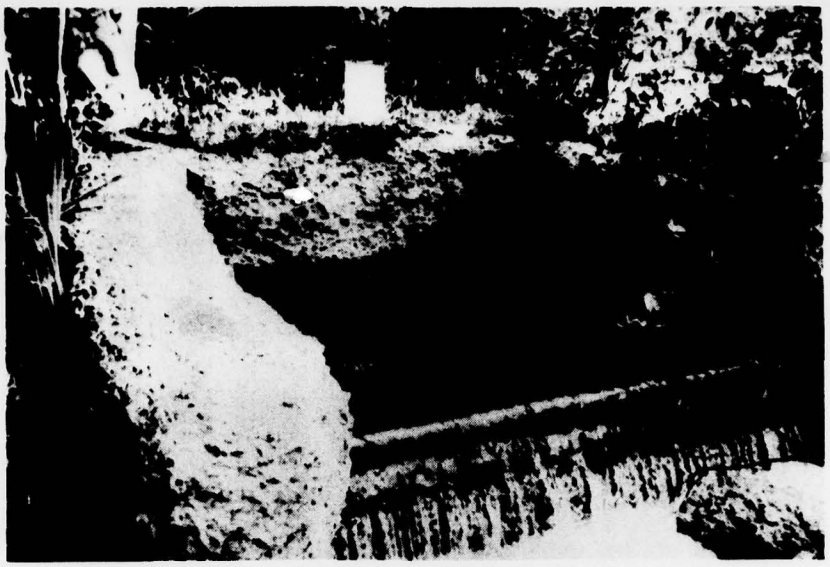
Col. Clark H. Benn
New York District Engineer

1. View of dam and spillway. Notice deteriorated wing wall. Concrete spillway surface in picture is coated with dead algae material.

2. Opposite view from above looking south along top of dam towards spillway. Note heavy vegetative growth on dam embankment.

5. View from location of north abutment looking towards top of dam. Notice substantial tree growth on shallow embankment.

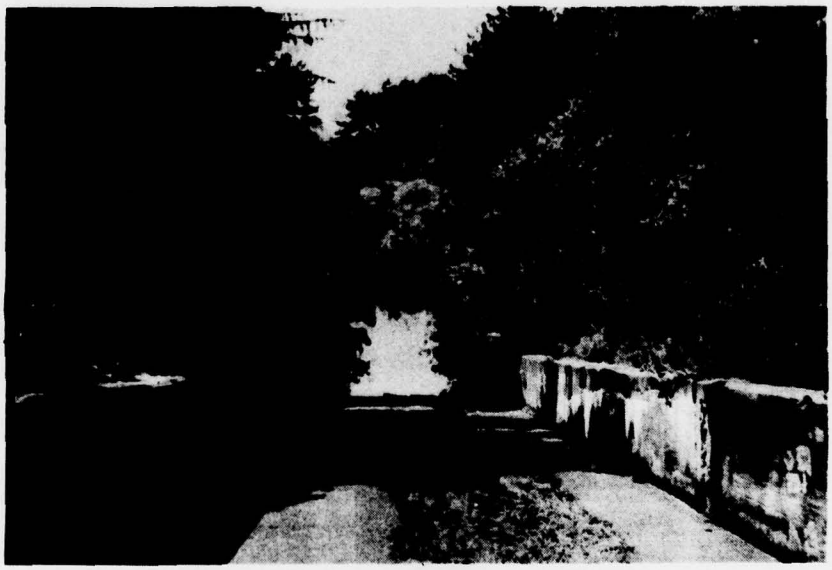
6. Detail of wet area at junction of north abutment and embankment. Seepage suspected with no sign of flow or piping. Note soft-drink can in picture.



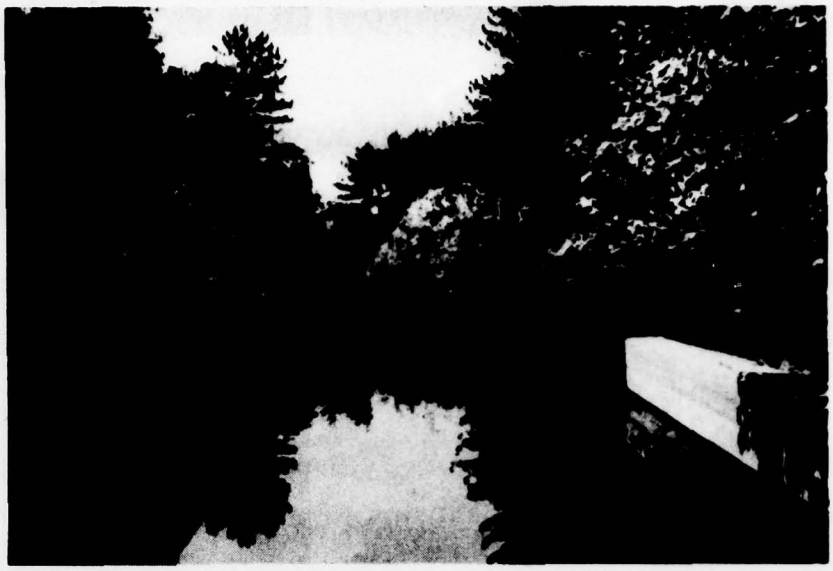
9. Detail of outlet box, pipe is submerged. Notice deteriorated condition of concrete. Weir width 84 inches, depth of flow 1-1/2 inches.

10. Overbank area below toe of dam on south side. Growth indicative of wetness.

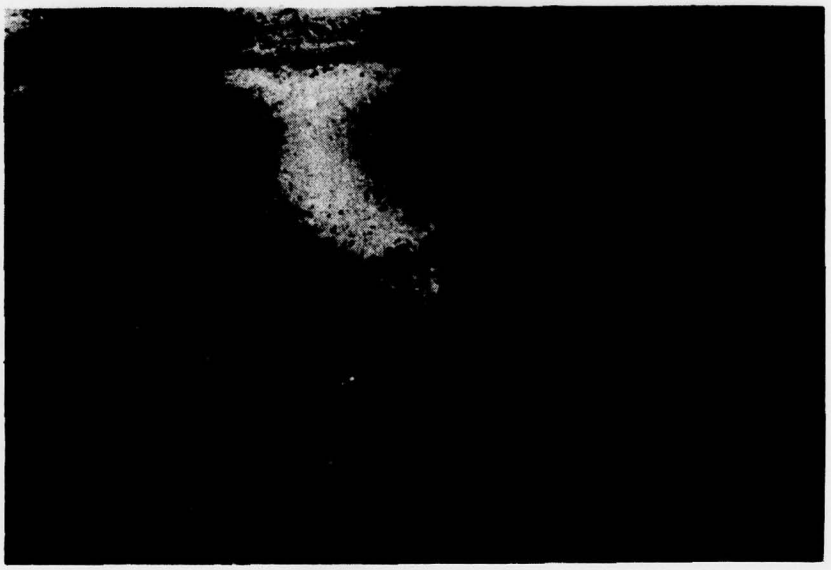
11. View looking up spillway. Material in center of spillway dry, dead algae particles, evidence that spillway not in recent use.



12. View looking down spillway.

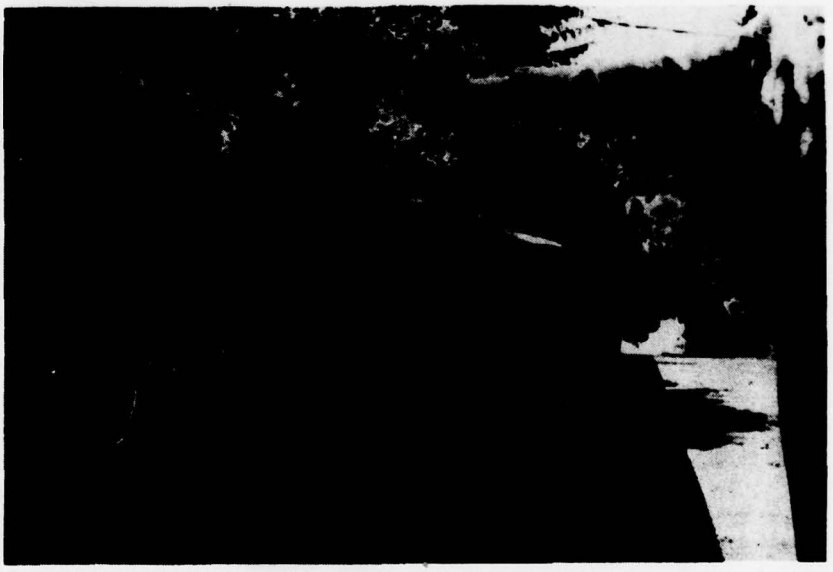


13. Detail of discharge area below terminus of spillway. Notice heavy overgrowth between spillway and main channel to the right.

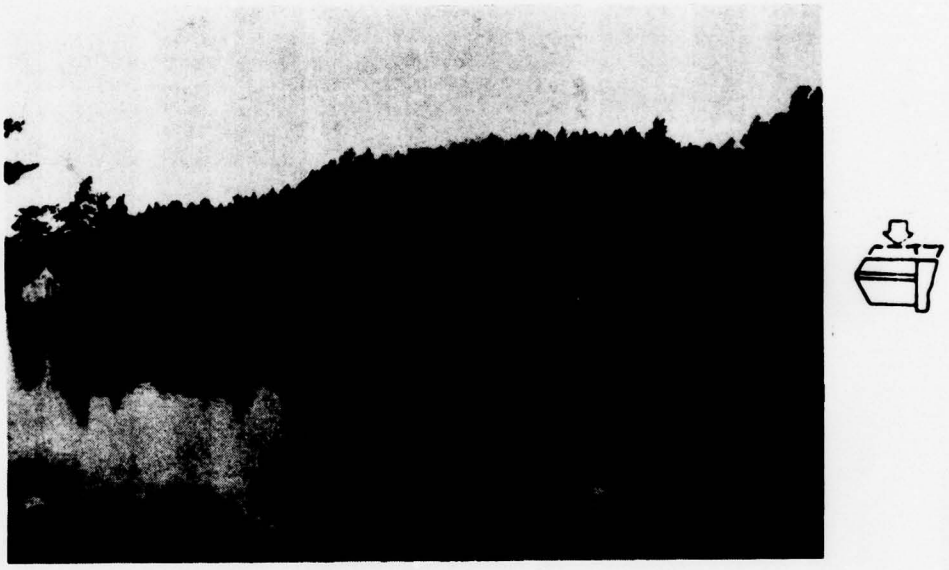


14. Cavity in spillway floor (see photograph eleven, left side spillway). Deterioration of concrete. Notice pen in picture.

15. Detail of cavity in spillway between right foot and wall. Construction joint stepped here and this is the only cavity area. The center portion between this joint and the ogee face sounds hollow beneath the slab. Foundation material is suspected to have piped out.



16. Detail of south spillway wall misalignment. Top of wall is 2 inches out of alignment. Suspected to have occurred due to moisture and ice conditions.



17. View of face of dam. Notice substantial tree growth.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
NAME OF DAM - ATTICA ID# - NY445

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

Authority for this report is provided by the National Dam Inspection Act, Public Law 92-367 of 1972. It has been prepared in accordance with a contract for professional services between Dale Engineering Company and The New York State Department of Environmental Conservation.

b. Purpose of Inspection

The purpose of this inspection is to evaluate the structural and hydraulic condition of the Attica No. 3 Dam and appurtenant structures, and to determine if the dam constitutes a hazard to human life or property and to transmit findings to the State of New York.

This Phase I inspection report does not relieve an Owner or Operator of a dam of the legal duties, obligations or liabilities associated with the ownership or operation of the dam. In addition, due to the limited scope of services for these Phase I investigations, the investigators had to rely upon the data furnished to them. Therefore, this investigation is limited to visual inspection, review of data prepared by others, and simplified hydrologic, hydraulic and structural stability evaluations where appropriate. The investigators do not assume responsibility for defects or deficiencies in the dam or in the data provided.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances

Attica Reservoir No. 3 is an earth embankment with a concrete core wall. The height of the structure is about 32 feet. The length of the embankment is approximately 300 feet. Top width of the earth fill is 10 feet. The slopes are heavily overgrown with trees and heavy brush. Reforestation near the north abutment has encroached onto the embankment for a considerable distance. The principal spillway is located approximately 100 feet north of the south abutment. The spillway consists of a ogee crested weir with a width of 40 feet at the mouth necking down to 15 feet chute as it descends the embankment. The spillway is constructed of concrete with concrete sidewalls approximately 4 feet in height. The spillway discharges into a small slow flowing stream which is heavily overgrown with brush and typical stream side foliage. The dam is equipped with a 20 inch cast iron drainline which discharges into the same

receiving stream as the principal spillway. Flow through the drainline is controlled by manipulation of a gate valve located in the center of the embankment. According to Mr. James Mooney, Village Engineer, this is operable and is checked periodically.

b. Location

Attica Reservoir No. 3 is located in the Town of Attica in Wyoming County, New York. The dam is built across Crow Creek about 5 miles from its confluence with Tonawanda Creek.

c. Size Classification

The dam is about 32 feet high and has a storage capacity of about 2,518 acre feet. Therefore, the dam is in the intermediate size category as defined by the Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification

There are a few residential structures located along the bank of Crow Creek downstream from the impoundment. The point of confluence with Tonawanda Creek which flows through the Village of Attica is a significant distance from the impoundment. In the village, property damage would occur. Therefore, the dam is in the significant hazard potential category as defined by the Recommended Guidelines for Safety Inspection of Dams.

e. Ownership

The dam is owned by the Village of Attica, New York.

f. Purpose

The dam is used as a water supply reservoir. This facility is used to control flows into the downstream reservoirs which are connected into the village water system.

g. Design and Construction History

This dam was designed in 1930 by James P. Wells, Consulting Engineer, 80 East Avenue, Rochester, New York. Photographs in the report show the structure after construction in 1930 (see figure 8). No other information has been discovered relative to the construction of the facility. At the time of the inspection of the dam, construction was underway for the installation of an automatic valve at the drainline of the reservoir. As part of this construction, a diagonal excavation had been made on the downstream face of the embankment and as shown in Photograph No. 8.

h. Normal Operational Procedure

Normal operating procedure includes routinely checking the drain control valve and to allow excess flows to discharge over the spillway.

1.3 PERTINENT DATA

a. Drainage Area

The drainage area of the Attica Reservoir Number 3 is 3.10 square miles.

b. Discharge at Dam Site

The maximum spillway capacity is estimated to be about 800 cfs. The maximum drawdown discharge capacity is approximately 40 cfs. No discharge records are available for the dam site. The site is not easily accessible for observations during events. All that is known is that in the spring of the year, the spillway is almost always in operation.

c. Elevations (feet above MSL)

Top of dam	1618.0
Maximum pool-design discharge	1618.0 (1/2 PMF)
Emergency spillway	1612.0
Stream bed at centerline of dam	1589.0

d. Reservoir

Length of top of dam pool	5500 feet
Length of maximum pool	5500 feet
Length of normal pool (at top of spillway)	5500 feet

e. Storage

Top of dam	2520 acre-feet
Design surcharge	2500 acre-feet (1/2 PMF)
Spillway Crest	1560 acre-feet

f. Reservoir Surface

Top of dam	139 acres
Maximum pool	140 acres (1/2 PMF)
Recreational/conservation pool	135 acres

g. Dam

Type - Earth embankment with concrete core wall.
Length - 300 feet plus spillway.
Height - 32 feet.
Freeboard between normal pool and top of dam - 6 feet.
Top Width - 10 feet.
Side Slopes - Upside 1:2-1/2, downside 1:2.
Zoning - Homogenous (apparently).
Core - Concrete core wall. Depth varies, average depth estimated 10 feet below original ground surface. See plans in this report.
Grout Curtain - None recorded.

SECTION 2 - VISUAL INSPECTION

2.1 SUMMARY

a. The visual inspection of the Attica Dam took place on June 15, 1978. At that time the dams 20-inch drainage outlet control was being modified to incorporate an automatic electrically operated gate to control discharge to the lower reservoir for the purpose of selling substantial amounts of raw water to an industrial firm.

b. Dam

The dam visually conforms to the plans shown in this report. The dam embankment shows wetness at the north abutment and along the toe. During inspection there was no indication of flow from these suspected seepage areas. The embankment showed no signs of erosion or piping, although close inspection of all embankment areas was prohibited due to heavy vegetative growth. The embankment slopes, top of dam, and north abutment area are covered with heavy brush and trees. Trees in the center of the embankment measure up to 12 inches. On the north end of the embankment over the abutment, trees up to 24 inches in diameter were observed.

c. Appurtenant Structures

Both the concrete structures, the spillway and outlet box, show considerable wear with concrete spalling and deterioration. Photographs of the spillway wing wall and of the outlet structure are included herein. A number of cavities have developed in the spillway slab surface, and it is suspected that the material under the slab below the ogee crest may have piped out beneath the slab over the years. A portion of the south spillway wall is out of alignment probably due to either earth moisture or ice conditions.

d. Reservoir Area

The reservoir drainage area is largely forested. In the immediate area above the dam there were no signs of siltation.

e. Downstream Channel

The downstream channel below the spillway is overgrown with heavy brush and trees. The stream channel below the embankment has no signs of erosion and it also contains heavy vegetation.

SECTION 3 - HYDROLOGY AND HYDRAULICS

3.1 EVALUATION OF FEATURES

a. Design Data

No information was obtained relevant to design of the dam. For this investigation, the dam was evaluated for a Probable Maximum Flood (PMF) hydrograph using Probable Maximum Precipitation rainfall data obtained in Hydrometeorlogical Report No. 51. Both the PMF and 1/2 PMF were evaluated whereas the 1/2 PMF was assumed to be approximately the Standard Project Flood (SPF) in utilizing the U.S. Army Corps of Engineers Hydrologic Engineering Center's Computer Program UHCOMP. The program UHCOMP was used to develop a unit hydrograph computed by Clark Method parameters and a flood hydrograph. The U.S. Army Corps of Engineers Hydrologic Engineering Center's Program HEC-1 was used to route the flood through the dam emergency spillway using the Modified Puls Method. The 20-inch drainpipe was assumed not to be in operation during the flood crest since it requires manual operation and is capable of only a negligible amount of discharge. It was assumed that the concrete spillway with a small ogee crest was on the threshold of spilling at the start of the flood routing and there was no flood storage available below the top of spillway elevation. Peak flow discharges were approximately 4600 cfs and 1300 cfs for the PMF and 1/2 PMF events routed through the spillway. The relatively large reservoir impoundment area above the dam face reduced the 1/2 PMF discharge by over 50 percent from 2800 cfs to 1300 cfs, however the estimated spillway capacity is at only 800 cfs. The computed stage - discharge relationship on page C-14 indicates the dam would be overtopped by more than one foot.

b. Experience Data

No information was obtained from knowledgeable people at the site relevent to performance of the spillway during extreme rainfall events. Only that in the spring of each year the dam is spilling, but routinely that it is not significant. It should be noted that the dam cannot be observed from a roadway and that it is relatively inaccessible and not visible from off of the fenced in property.

SECTION 4 - STRUCTURAL STABILITY

4.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

Visual inspection of this earthen embankment - concrete core wall dam indicates no evidence of a past stability failure; no misalignment, embankment sloughing, significant erosion, or cracking was noted. However, the upstream and downstream faces of the embankment have been poorly maintained through the years, and there presently is considerable plant and tree growth on these slopes. The presence of the vegetation interferes with close examination of embankment faces in all areas.

The lower half (approximately) of the downstream face in the vicinity of the dams northerly abutment is wet and somewhat swampy. The affected area is located in the general vicinity which the design drawings indicate as being near the northerly limit of the concrete core wall. The observed condition is believed to be the result of reservoir seepage, occurring around/beneath the northerly section of core wall, or through cracks which have developed in this concrete cutoff facility. No indication of piping, boils, or seepage flow was detected in the areas embankment surface, however.

A narrow shallow ditch has been temporarily excavated near the downstream toe along approximately the southern half of the dam, to permit installation of electrical conduit. Some damp soil was observed in the lower sections of ditch. It could not be determined if this condition was from past rains or seepage.

The concrete spillway and wing walls have experienced deterioration, spalling and cracking. No indication of resevoir seepage or embankment erosion was observed in the vicinity of wingwall abutments. However, cavitation observed beneath sections of spillway slab may be the result of past underslab seepage or piping. No seepage was noted at the time of the inspection. Similarly, no indication of seepage or piping was noted at the downstream outlet of the intake-drawdown pipe.

The upstream face of the constructed embankment has been provided with a protective riprap cover. Some of this material has been displaced at elevations generally corresponding to the reservoirs water surface. This is probably the result of ice/wave action, but may also be from seismic effects.

b. Geology and Seismic Stability

The general area encompassing the reservoir site in underlain by Upper Devonian sandstone, siltstone, and shale. The surface

material is a glacial silty clay till and sand till, compact and generally impermeable (New York State Geologic Map, 1971).

No rock outcroppings were observed in the vicinity of the dam and there is no record of depth to bedrock in the general area of the reservoir.

As indicated on the map a fault is present beneath the reservoir (information indicating location and relative depth of the fault has been supplied by the staff of the New York State Geological Survey). This fault, only part of which is shown on the map, is the west branch of the Clarendon-Linden fault. The New York survey records indicate significant earthquake activity in this area. Although most activity has been of low intensity, some has been of moderate intensity as shown below:

Date	Intensity Modified Mercalli	Intensity (Richter Equivalent)
Jan. 1, 1966	VI	5.0 - 5.9
July 16, 1965	IV	4.0 - 4.9
Aug. 16, 1955	V	4.0 - 4.9
Dec. 3, 1929	IV	4.0 - 4.9
Dec. 2, 1929	IV	4.0 - 4.9
Aug. 12, 1929	VIII	6.0 - 6.9

Other earthquakes have occurred in this area, many of whose focus was in the vicinity of the reservoir.

According to the staff of the New York Survey, this is a very active area. Furthermore, the occurrence of future earthquake activity of intensity VII, perhaps VIII (MM), is possible and probable.

c. Data Review and Stability Evaluation

The design drawings specify a dam cross-section consisting of a concrete core (or cutoff) wall and earthen upstream and downstream embankments. The core wall extends almost the full length of the dam, stopping short of the abutment limits. This wall is a thin reinforced concrete section which was to penetrate approximately seven feet below original ground level and rise to within three feet of the top of the finished dam. The core wall probably does not penetrate to rock. A riprapped upstream slope of 2-1/2 horizontal on 1 vertical, and a downstream slope of 2 on 1, is indicated. Visually, the embankment conforms to this design. Similarly, visual aspects of the spillway and intake structures indicate conformance to the design.

The design plans indicate spillway excavation is to be utilized as embankment material. Probably this material consisted of glacial till including clay, silt and sand materials (see above geologic data). No records are available to indicate the method of soil

placement and compaction; in all probability, the construction of this dam consisted of rolled earth type construction (placement in layers, more or less, with some compaction of layers) and was not a hydraulic placement. The indicated slopes are typical for this type construction (soil types and dam height). The seepage detected on the downstream face near the dams northerly embankment could be the effect of past earthquake activity.

The professions experience with other structures of characteristics similar to this dam and the service life of this embankment suggest adequacy. Recent publications (as of this writing) on the performance of earth dams during earthquakes implies that rolled earth embankments which include plastic, cohesive soils and are located on firm foundations retain stability when subject to moderate earthquake forces. Effects of repeated seismic shocks are not well established however.

Maintenance is urgently required for this dam. Such attention should include removal of existing trees (and similar heavy vegetation) to prevent root locations from developing as seepage paths through the embankment, or embankment damage from overturned trees, and the reestablishment of riprap on the upper face of the downstream embankment. The upstream and downstream areas of the cleared embankment faces at the northerly end of the dam, in the vicinity of existing seepage should be closely examined for signs of cracking, settling or other structural movement. As a minimum, assuming no indications of structural concern, the general area of the wetted downstream face should be provided with gravel and riprap to minimize the opportunity for future erosion or piping, and to increase the travel distance for seeping water to outlet.

SECTION 5 - ASSESSMENT/REMEDIAL MEASURES

5.1 DAM ASSESSMENT

Both the Phase I visual examination and the hydrology computations for the Attica Dam indicate several areas where problems either exist or may occur. The physical examination has detected wet areas along the south abutment and in the area of the drain line of the dam. Although no water flow was detected during the visual inspection, some seepage through the dam may be occurring at these points. Large areas of the embankment are covered by heavy brush growth and large trees. At the time of the inspection, an excavation had been made diagonally down the downstream face of the embankment to allow for the installation of electric wiring an automatic control valve on the principal outlet. Improper backfilling of this excavation could cause problems in the stability of the downstream slope of the dam.

Deterioration of the concrete in the emergency spillway and the outlet box indicate the source of probable future problems. The Phase I hydrology analysis indicates that the spillway capacity does not meet the requirements in the Recommended Guidelines for Safety Inspection of Dams. A storm of one-half maximum probable flood will overtop the structure.

5.2 REMEDIAL MEASURES

a. Alternatives

A further investigation should be conducted on this dam as soon as possible. These investigations should direct attention to the detection of the source of suspected seepage that was detected during this investigation and to allow additional analysis of the structure. The following remedial work is also recommended:

(1) The reservoir should be drawn down to investigate the upstream face of the dam to detect any possible structural failures.

(2) Slopes should be cleared of trees and stumps and heavy underbrush.

(3) An investigation should also be conducted to determine the practices that took place during the backfill of the ditch on the downstream face of the structure. Remedial work should be taken if defects in this backfill are evident.

(4) Attention should be directed towards sloughing that has occurred in the riprap near the south abutment.

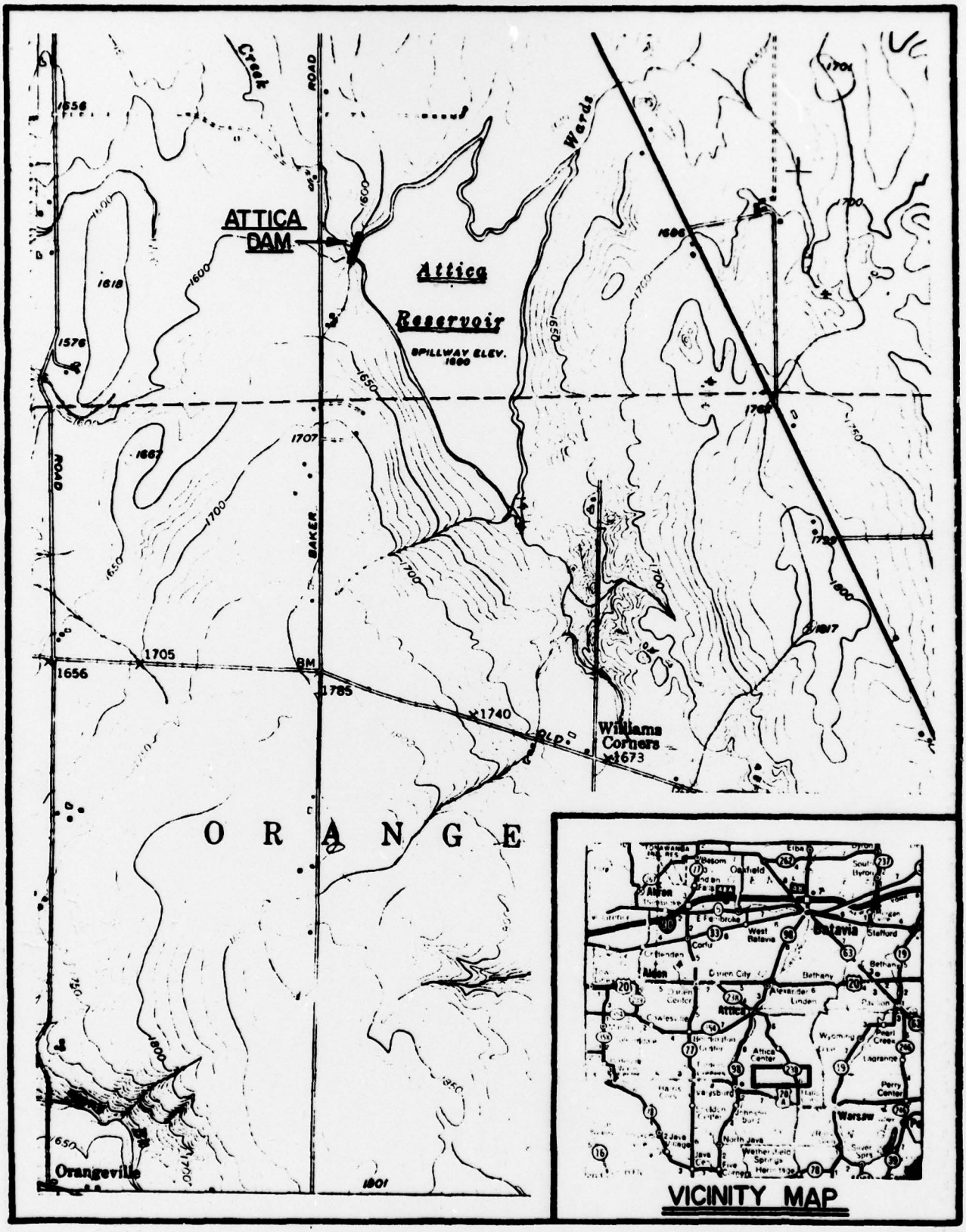
(5) Deteriorated concrete in the spillway and the outlet box should be repaired and investigation of the possibility of voids under the emergency spillway should be conducted.

(6) Additional analysis should be made to define the hydrologic aspects of the dam being overtopped during a 1/2 Probable Maximum Flood and to determine what level of protection the spillway is capable of providing.

(7) In lieu of further investigations the seismic aspects and structural stability should be verified.

b. Operation and Maintenance

Normal operating procedure includes routinely checking the drain control valve and to allow excess flow to discharge over the spillway. The dam embankment should be cut, cleared and routinely maintained.



LOCATION PLAN

FIGURE 1

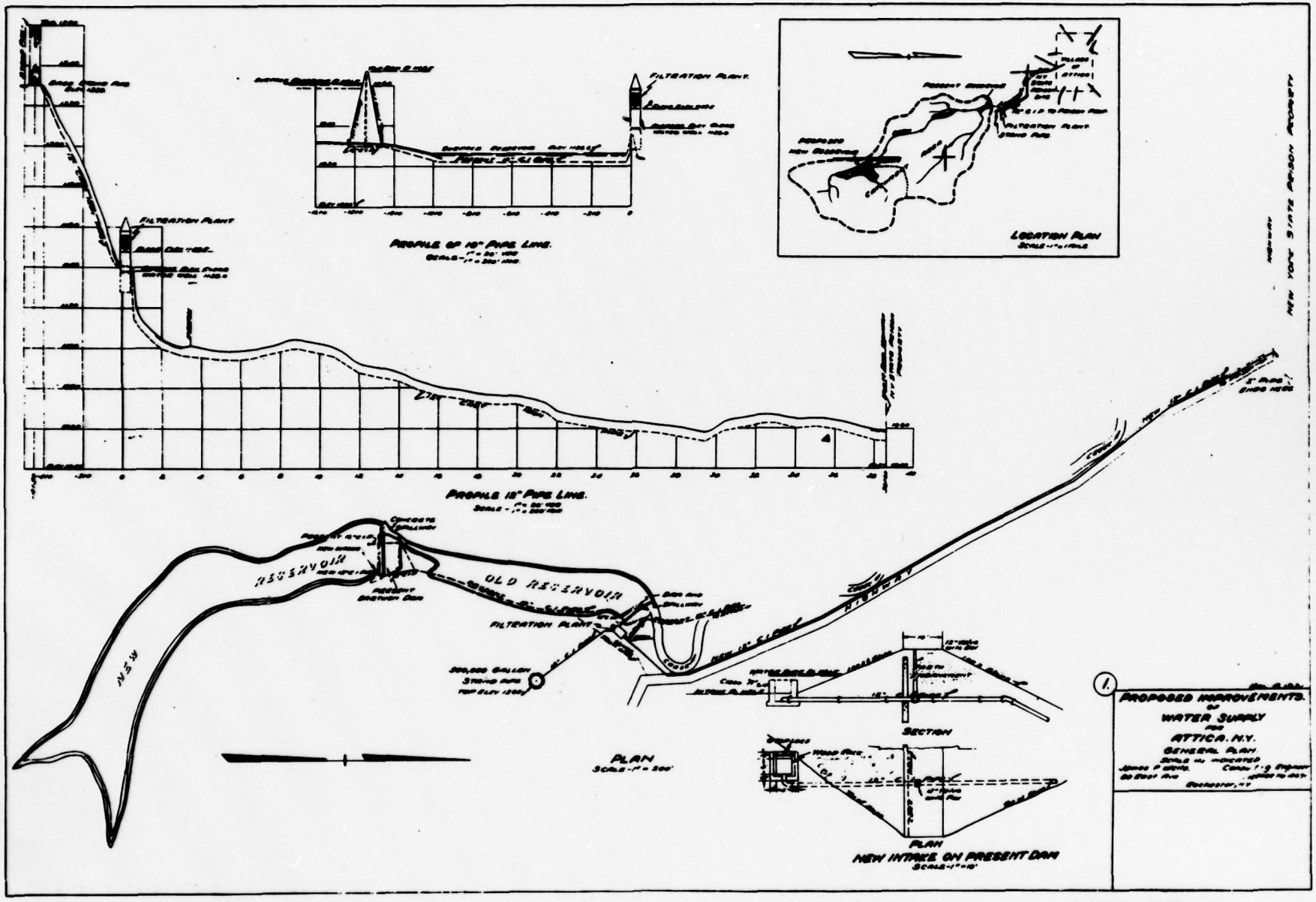

PROFILE OF 16" PIPE LINE.
LOCATION PLAN
PROFILE 18" PIPE LINE.
NEW RESERVOIR
OLD RESERVOIR
FILTRATION PLANT
PLAN
SECTION
PLAN
NEW INTAKE ON PRESENT DAM
PROPOSED IMPROVEMENTS
OF
WATER SUPPLY
FOR
ATTICA, N.Y.
GENERAL PLAN

FIGURE 2

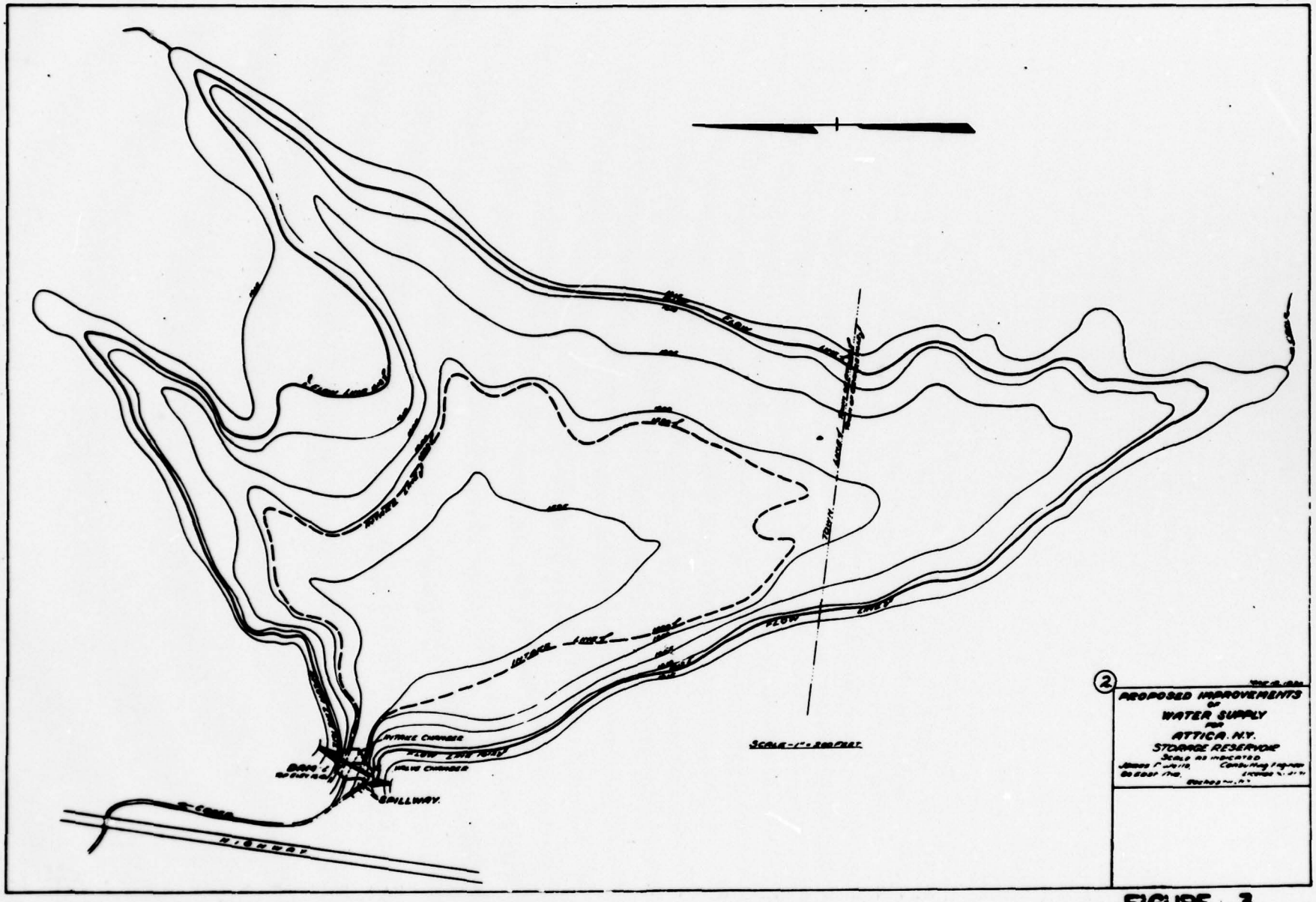

SCALE - 1" = 200 FEET
SPILLWAY
PROPOSED IMPROVEMENTS
OF
WATER SUPPLY
FOR
ATTICA, N.Y.
STORAGE RESERVOIR

FIGURE 3

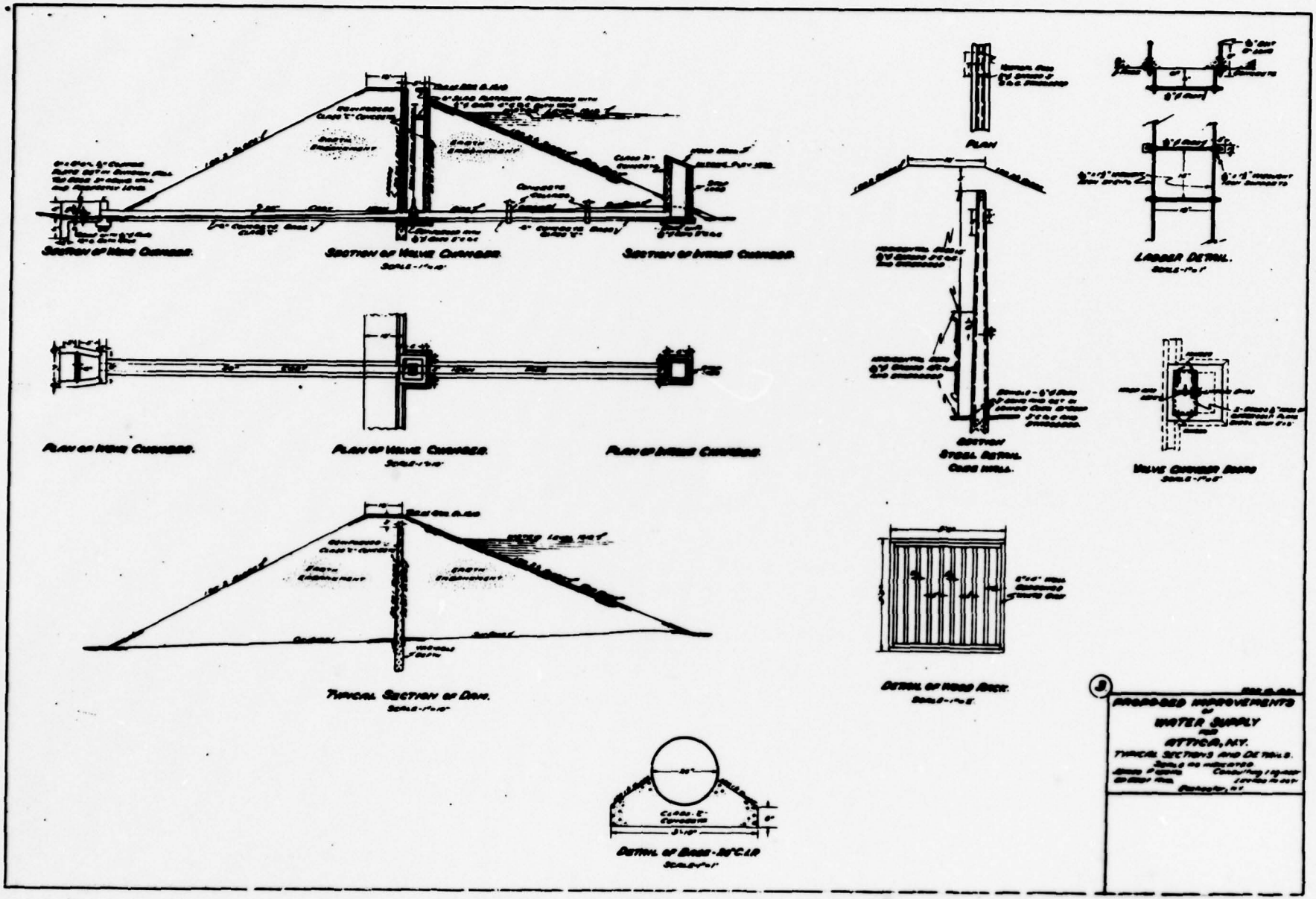

SECTION OF VALVE CHAMBER
PLAN OF VALVE CHAMBER
PLAN
LADDER DETAIL.
VALVE CHAMBER ROOF
TYPICAL SECTION OF DAM.
DETAIL OF HOOD ROOF.
PROPOSED IMPROVEMENTS
OF
WATER SUPPLY
FOR
ATTICA, N.Y.
TYPICAL SECTIONS AND DETAILS.

FIGURE 4

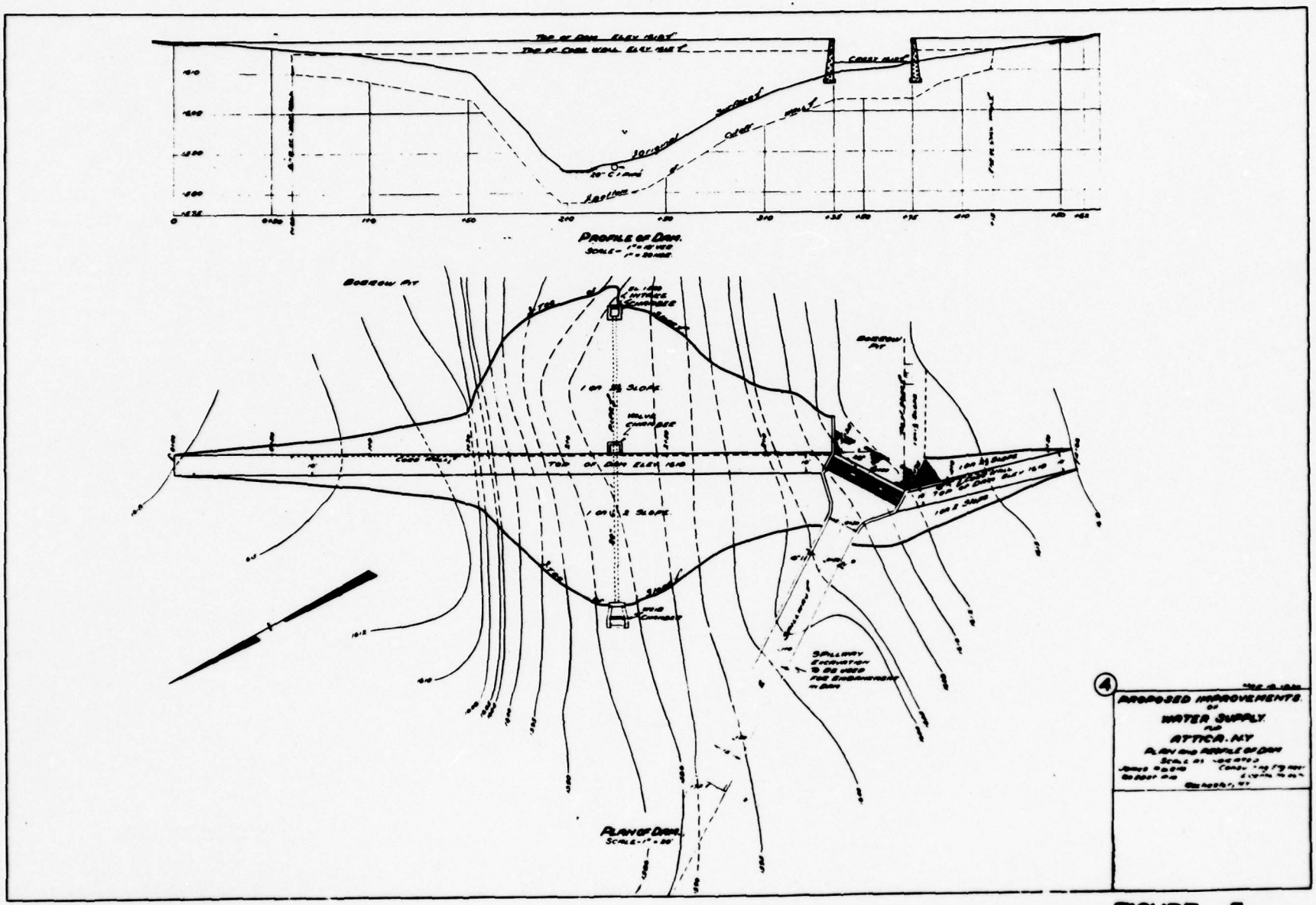

PROFILE OF DAM.
PLAN OF DAM.
BORROW PIT
SPILLWAY EXCAVATION TO BE USED FOR EMBANKMENT IN DAM
PROPOSED IMPROVEMENTS OF WATER SUPPLY FOR ATTICA, NY
PLAN AND PROFILE OF DAM

FIGURE 5

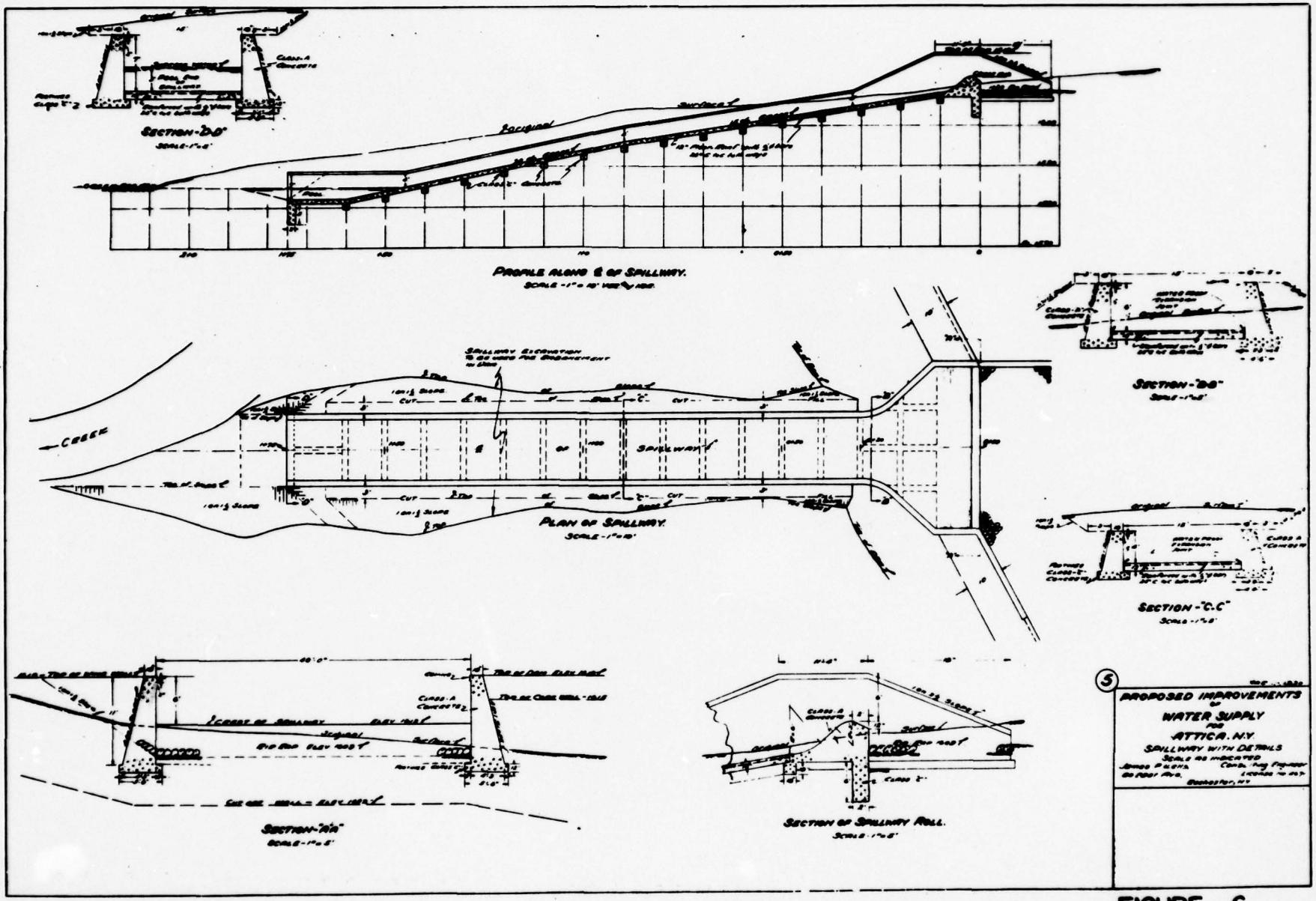
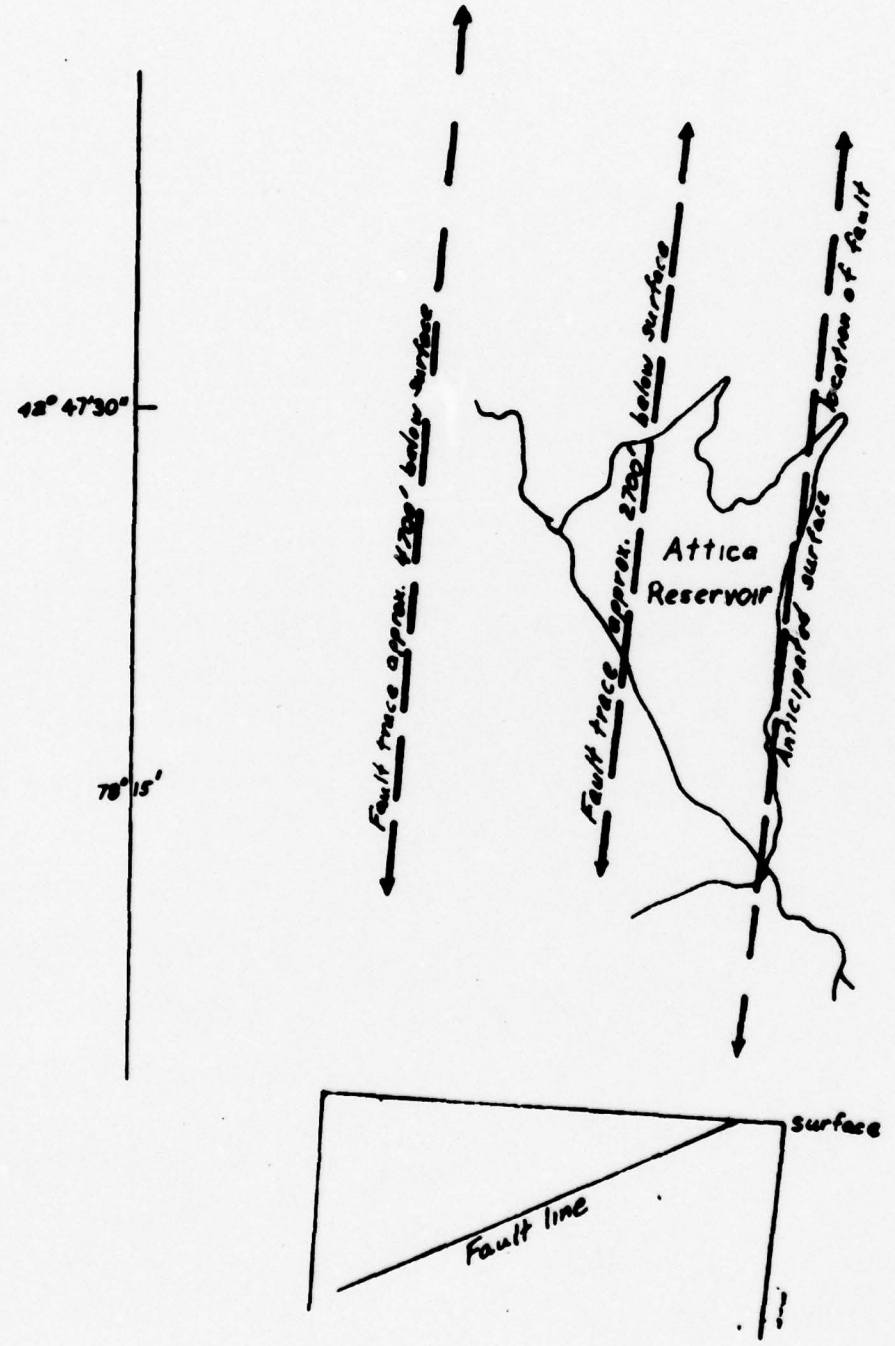

SECTION-"B-B"
PROFILE ALONG ℄ OF SPILLWAY.
SECTION-"B-B"
CREEK
SPILLWAY
PLAN OF SPILLWAY.
SECTION-"C-C"
SECTION-"A-A"
SECTION OF SPILLWAY ROLL.
PROPOSED IMPROVEMENTS
OF
WATER SUPPLY
FOR
ATTICA, N.Y.
SPILLWAY WITH DETAILS

FIGURE 6



GEOLOGIC MAP
FIGURE 7

VIEWS TO THE NORTH:

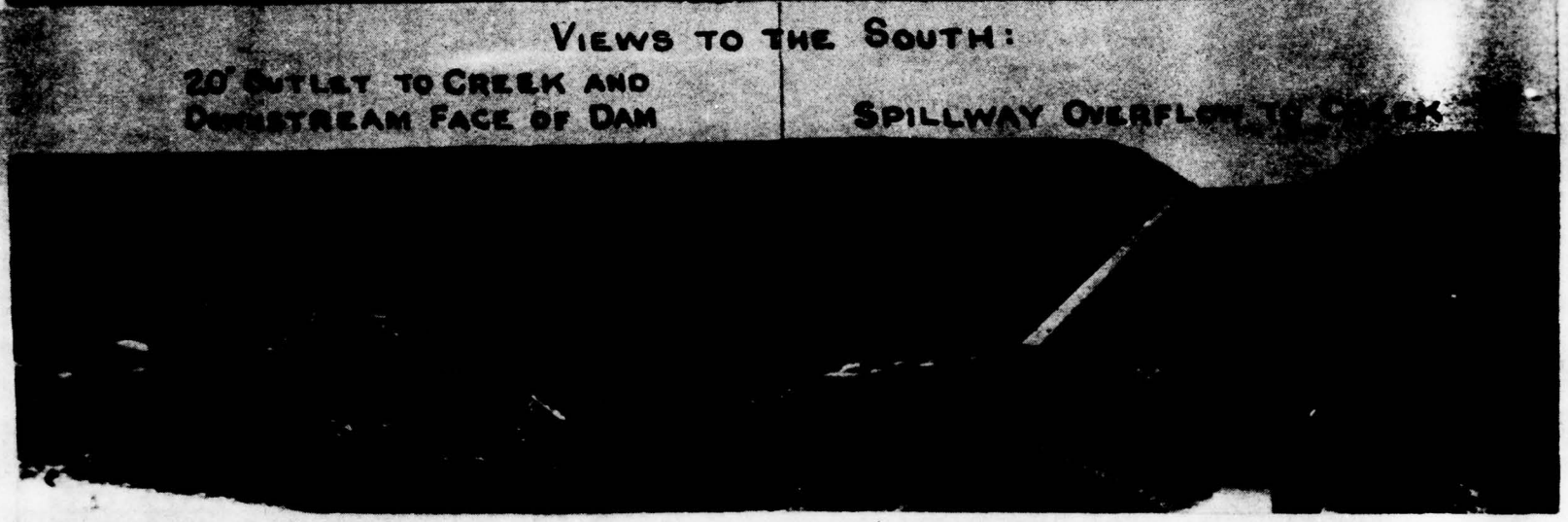
SPILLWAY OVERFLOW

INLET TO 20" PIPE OUTLET AND INTERIOR FACE OF DAM

VIEWS TO THE SOUTH:

20" OUTLET TO CREEK AND DOWNSTREAM FACE OF DAM

SPILLWAY OVERFLOW TO CREEK



VILLAGE OF ATTICA WATERWORKS

UPPER DAM AND RESERVOIR NO. 3 (500 M.G. CAP.)

PHOTOGRAPHS OF CONSTRUCTION COMPLETED 1930

C.G.B.

MARCH 1966

NUSSBAUMER CLARKE AND VELZY, INC.

FIGURE 8

APPENDIX A

FIELD INSPECTION REPORT

CHECK LIST
VISUAL INSPECTION

PHASE 1

Name Dam Attica County Wyoming State New York ID # 445

Type of Dam Earthen Hazard Category 1

Date(s) Inspection June 15, 1978 Weather Clear Temperature 70°

Pool Elevation at Time of Inspection 6" below top of spillway M.S.L. Tailwater at Time of Inspection below outfall

Inspection Personnel:

N. F. Dunlevy	Dale Engineering Company	Mr. Mooney - Village of Attica
F. W. Byszewski	Dale Engineering Company	
H. Muskatt	Dale Engineering Company	
D. McCarthy	Dale Engineering Company	

Neal F. Dunlevy Recorder

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	N/A	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	N/A	
DRAINS	N/A	
WATER PASSAGES	N/A	
FOUNDATION	N/A	

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	N/A	
STRUCTURAL CRACKING	N/A	
VERTICAL & HORIZONTAL ALIGNMENT	N/A	
MONOLITH JOINTS	N/A	
CONSTRUCTION JOINTS	N/A	
STAFF GAGE OF RECORDER	N/A	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed; heavy vegetation.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed; heavy vegetation.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	None observed; heavy vegetation.	
VERTICAL AND HORIZONTAL ALINEMENT OF THE CREST	Evaluation affected by heavy vegetative growth.	
RIPRAP FAILURES	Minor disarrangement on upstream face. A few rocks are missing, possibly moved by fishermen or others.	Recommend placement of additional riprap for repair of upstream face above and below top of spillway water line.

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
EMBANKMENT COVER CROP	Heavy vegetative growth. Left embankment over abutment in mature tree stand. Center embankment with a dozen trees.	Recommend removal of trees. Excavation of material to remove major root systems Replace with appropriately prepared and compacted materials.
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	One 12" in diameter. Left abutment, wetness almost entire length. Slow seepage. Embankment quite soft. Footprint sinks 4" into soil. No coloration to give evidence of piping.	Recommend seepage be monitored to determine source so that seepage problem can be corrected.
ANY NOTICEABLE SEEPAGE	See above. Also left of principal outfall box at elevation of pipe. Downstream toe has wetness and is marshy either side of outfall.	Recommend toe of dam be monitored for seepage with appropriate actions to correct any seepage problems.
STAFF GAGE AND RECORDER	None observed.	
DRAINS	None observed.	In lieu of seepage evidence, the location and condition of drains should be determined as part of any remedial action.

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	Slab surface in good condition. Left wing wall severely spalled and scaled. Slab foundation material appears to have leaked out thru large opening in construction joint. Efflorescence of spillway walls.	Replace left spillway end wall. Replace slab or grout under slab. Fix opening in construction joint.
APPROACH CHANNEL	Approach channel is unobstructed. Is submerged in face of dam.	
DISCHARGE CHANNEL	Two transverse cracks across spillway slab. Spillway walls contain pattern cracking and efflorescence. Heavy vegetative growth below spillway.	Monitor condition of concrete in spillway system. Remove growth below spillway.
BRIDGE AND PIERS	None.	

GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	None	
APPROACH CHANNEL	None	
DISCHARGE CHANNEL	None	
BRIDGE AND PIERS	None	
GATES AND OPERATION EQUIPMENT	None	

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	None observed.	
INTAKE STRUCTURE	None observed.	
OUTLET STRUCTURE	Partially clogged with rocks. Excessive deterioration of concrete. Very severe scaling of outlet box.	Replace outlet box.
OUTLET CHANNEL	Clear, unobstructed.	
EMERGENCY GATE	None.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Immediate downstream overbank area swampy. Emergency spillway discharge area is overgrown.	Could be related to surface drainage from abutment and lack of positive drainage from embankment.
SLOPES	Downstream gradient very flat.	
APPROXIMATE NO. OF HOMES AND POPULATION	One large working farm downsteam of dam in floodway.	

INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS		
OBSERVATION WELLS		
WEIRS		
PIEZOMETERS		
OTHER		

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Tree-lined shore. Little or no slopes.	
SEDIMENTATION	Minimal.	

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE 1

NAME OF DAM Attica Dam No. 3

ID # 445

ITEM	REMARKS
AS-BUILT DRAWINGS	None exist.
REGIONAL VICINITY MAP	Available from Plans.
CONSTRUCTION HISTORY	No data. See photograph taken at completion of Dam.
TYPICAL SECTIONS OF DAM	Available from Plans.
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS	 See Plans. Will develop in this report.
RAINFALL/RESERVOIR RECORDS	Records available from Village of Attica at Water Filtration Plant Site.

ITEM	REMARKS
DESIGN REPORTS	None available.
GEOLOGY REPORTS	None available.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None available.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None available.
POST-CONSTRUCTION SURVEYS OF DAM	None available.
BORROW SOURCES	No information.

ITEM	REMARKS
MONITORING SYSTEMS	None
MODIFICATIONS	None
HIGH POOL RECORDS	None
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	See photograph enclosed in this report.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None
MAINTENANCE OPERATION: RECORDS	None

ITEM	REMARKS
SPILLWAY PLAN SECTIONS DETAILS	See Plans.
OPERATING EQUIPMENT PLANS & DETAILS	20" Valve. Manual operated. Checked once per year for operation.

ATTICA DAM #3
CHECK LIST
HYDROLOGIC & HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 3.0 square miles

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 1612'

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 1612'

ELEVATION MAXIMUM DESIGN POOL: 1618'

ELEVATION TOP DAM: 1618'

CREST:

a. Elevation 1612'
b. Type Ogee concrete spillway
c. Width 15 feet
d. Length 175 feet
e. Location Spillover Northeast side of dam.
f. Number and Type of Gates None

OUTLET WORKS: (Drawdown Works)

a. Type One 20" pipe w/valve
b. Location Center of dam
c. Entrance Inverts 1599'
d. Exit Inverts 1539'
e. Emergency Draindown Facilities Yes, 1 manual valve.

HYDROMETEOROLOGICAL GATES:

a. Type None
b. Location None
c. Records None

MAXIMUM NON-DAMAGING DISCHARGE: Not computed. One working farm 1/4 mi. below spillway. Village of Attica approximately 3 miles downstream.

APPENDIX B

PREVIOUS INSPECTION REPORTS

STATE OF NEW YORK

DEPARTMENT OF PUBLIC WORKS

DIVISION OF ENGINEERING

ALBANY

Dam No. 3-Wyo-42

Watershed

Application for the Construction or Reconstruction of a Dam

Application is hereby made to the Superintendent of Public Works, Albany, N. Y., in compliance with the provisions of Section 426 of the Conservation Law (see last page of this application) for the approval of specifications and detailed drawings, marked Proposed Improvements of Water Supply for Attica, N.Y.

herewith submitted for the (construction / reconstruction) of a dam herein described. All provisions of law will be complied with in the erection of the proposed dam. It is intended to complete the work covered by the application about Oct 1, 1930 (date)

1. The dam will be on Cross Creek flowing into Tonawanda creek in the town of Attica, County of Wyoming and about 1/2 miles South of Attica Center (Give exact distance and direction from a well-known bridge, dam, village main cross-roads or mouth of a stream)

2. Location of dam is shown on the Great Lot Plans Batavia quadrangle of the United States Geological Survey.

3. The name of the owner is Village of Attica, N.Y.

4. The address of the owner is Attica, N.Y. (Village Clerk)

5. The dam will be used for Water Supply Purposes

6. Will any part of the dam be built upon or its pond flood any State lands? No

7. The watershed above the proposed dam is About 2 1/2 square miles.

8. The proposed dam will create a pond area at the spillcrest elevation of [illegible] acres and will impound [illegible] cubic feet of water.

9. The maximum height of the proposed dam above the bed of the stream is .... feet .... in.

10. The lowest part of the natural shore of the pond is .... feet vertically above the spillcrest, and everywhere else the shore will be at least .... feet above the spillcrest.

11. State if any damage to life or to any buildings, roads or other property could be caused by any possible failure of the proposed dam *Damage to property or loss of life?*

12. The natural material of the bed on which the proposed dam will rest is (clay, sand, gravel, boulders, granite, shale, slate, limestone, etc.) *Clay Soil*

13. Facing down stream, what is the nature of material composing the right bank? *Clay*

14. Facing down stream, what is the nature of the material composing the left bank? *Clay*

15. State the character of the bed and the banks in respect to the hardness, perviousness, water bearing, effect of exposure to air and to water, uniformity, etc. *Impervious*

16. Are there any porous seams or fissures beneath the foundation of the proposed dam? ....

17. WASTES. The spillway of the above proposed dam will be *40* feet long in the clear; the water will be held at the right end by an *abutment* the top of which will be *6* feet above the spillcrest, and have a top width of .... feet; and at the left end by an *abutment* the top of which will be *6* feet above the spillcrest, and have a top width of .... feet.

18. The spillway is designed to safely discharge *0.500* cubic feet per second. *[illegible]*

[illegible]

19. Pipes, sluice gates, etc., for flood discharge will be provided through the dam as follows: *20" cast iron*

20. What is the maximum height of flash boards which will be used on this dam? ....

21. APRON. Below the proposed dam there will be an apron built of .... feet long across the stream, ... feet wide and .... feet thick.

22. Does this dam constitute any part of a public water supply? ....

SECTION 948 OF THE CONSERVATION LAW

§ 948. **Structures for impounding water; inspection of docks; penalties.** No structure [illegible] and no dock, pier, wharf or other structure used as a landing place on waters shall be erected [illegible] any public authority or by any private person or corporation without notice to the superintendent [illegible] nor shall any such structure be erected, reconstructed or maintained without complying [illegible] the superintendent of public works may by order prescribe for safeguarding life or property [illegible] from. No order made by the superintendent of public works shall be deemed to authorize any [illegible] property rights, public or private, by any person in carrying out the requirements of such order. [illegible] dent of public works shall have power, whenever in his judgment public safety shall so require, to make an order directing any person, corporation, officer or board, constructing, maintaining or using any [illegible] inbefore referred to, remove, repair or reconstruct the same within such reasonable time and in [illegible] shall be specified in such order, and it shall be the duty of every such person, corporation, officer or [illegible] observe and comply with such order and with the conditions prescribed by the superintendent of [illegible] safeguarding life or property against danger therefrom, and every person, corporation, officer or [illegible] omitting or neglecting so to do, or who hereafter erects or reconstructs any such structure hereinbefore [illegible] without submitting to the superintendent of public works and obtaining his approval of plans and sp[illegible] for such structures when required so to do by his order or who hereafter fails to remove, erect or to [illegible] the same in accordance with the plans and specifications so approved shall forfeit to the people of this [illegible] not to exceed five hundred dollars to be fixed by the court for each and every offense; every violation [illegible] order shall be a separate and distinct offense, and, in case of a continuing violation, every day's continu[illegible] shall be and be deemed to be a separate and distinct offense. This section shall not apply to a dam whe[illegible] draining into the pond formed thereby does not exceed one square mile, unless the dam is more than [illegible] height above the natural bed of the stream at any point or unless the quantity of water which the dam [illegible] exceeds one million gallons; nor to a dock, pier, wharf or other structure under the jurisdiction of the d[illegible] of docks, if any, in a city of over one hundred and seventy-five thousand population. This section [illegible] amended shall not impair the effect of an order heretofore made by the conservation commission or com[illegible] under this section prior to the taking effect of chapter four hundred and nintey-nine of the laws of ninete[illegible] and twenty-one, nor require the approval by the superintendent of public works of plans and specification[illegible] fore approved by such commission or commissioner under this section.

The foregoing information and accompanying plans and specifications are correct to the best of my [illegible] and belief.

Village of [illegible], Owner.

By James P. [illegible] Authorized agent of owner. [illegible]

Address of signer 80 East Ave Date April [illegible]

Rochester, N.Y.

DAM INSPECTION REPORT
(By Visual Inspection)

Dam Number	River Basin	Town	County	Hazard Class	Date & Inspector
23-307	Erie	Attica	Wyoming	B-C	9/30/77 KDH

Stream = Attica Res. Crow Cr. Owner = Attica

Type of Construction

- [x] Earth w/Concrete Spillway
- [ ] Earth w/Drop Inlet Pipe
- [ ] Earth w/Stone or Riprap Spillway
- [ ] Concrete
- [ ] Stone
- [ ] Timber
- [ ] Other _____

Use

- [x] Water Supply
- [ ] Power
- [ ] Recreation - [ ] High Density
- [ ] Fish and Wildlife
- [ ] Farm Pond
- [ ] No Apparent Use-Abandoned
- [ ] Flood Control
- [ ] Other _____

Estimated Impoundment Size 170 Acres Estimated Height of Dam above Streambed 32 Ft.

Condition of Spillway

- [x] Service satisfactory
- [ ] *In need of repair or maintenance*
- [x] Auxiliary satisfactory
- [ ] *In need of repair or maintenance*

Explain: _____

Condition of Non-Overflow Section

- [x] Satisfactory
- [ ] In need of repair or maintenance

Explain: Trees + Brush

Condition of Mechanical Equipment

- [ ] Satisfactory
- [ ] In need of repair or maintenance

Explain: _____

Siltation [ ] High [x] Low

Explain: _____

Remarks: Loc. East of Baker Rd.
No Info on This Dam.

Evaluation (From Visual Inspection)

- [ ] Repairs req'd. beyond normal maint.
- [ ] No defects observed beyond normal maint.

No. _____

HOOKER CHEMICALS & PLASTICS CORP.
P.O. BOX 8
NIAGARA FALLS, NEW YORK 14302

RECEIVED
JUN 19 1978
DALE ENGINEERING COMPANY
BY _____

To: Neil Dunlevy
c/o Stefson-Dale
185 Genessee Street
Utica, N.Y. 13501

Project: _____

Date: _____

Attention: _____

Gentlemen: Under separate cover / Enclosed herewith you will find the following:

_____ Drawings _____ Ditto Sheets _____ Specifications _____ Shop Drawings _____ Sketches

No. of Copies	Sheet No.	Rev.	Title	Made By

Enclosed:

1. Crow Creek Water Shed Water Management System dated 2/22/78
2. HCPC Dale Brine 1977 Expansion dated 3/8/77. (Includes water flow information)

Remarks: The above report outlines what HCPC is doing at the three Attica Reservoirs. For your information.

These drawings are submitted / returned

_____ For Approval
_____ Approved
_____ Approved as Noted
_____ For Correction
_____ Preparation of Shop Drawings
_____ Other

_____ For Your Comment
_____ To be Resubmitted
_____ For Your Files
_____ For Your Use in the Field
_____ For Your Information
_____ For Final Approval

TRANSFER RECORD

Issued		Returned
Hooker	Contractor	Hooker
Date _____	Date _____	Date _____
Sig. _____	Sig. _____	Sig. _____

Very truly yours

HOOKER CHEMICAL CORPORATION

By Larry L. Dirickson

L.L. Dirickson
Project Engineer

cc: G.E. Patterson

March 8, 1977

SUBJECT: HCPC Dale Brine Plant 1977 Expansion

Hooker Chemicals & Plastics Corp., HCPC, is proposing to construct a pump house in the side of the lower (No. 1) Attica Reservoir for transferring 0.5 mgd of untreated water to HCPC's Dale, New York brine plant through a 6" pipe line. The reservoir is the lower of three reservoirs owned by the Village of Attica located on Crow Creek, a tributary to Tonawanda Creek, which drains part of the Erie-Niagara basin, see Figure 1. The Crow Creek water shed is southeast of Attica in Wyoming County in Western New York. This water will be used to supplement the existing water supply system.

Pump House Construction

The pump house will be a concrete building housing two vertical pumps and constructed in the side of the reservoir as shown by drawings A-139-S97 and A-140-S97. The reservoir will be drained during construction through the existing 30" pipe in the reservoir. The normal creek flow will continue through the 30" pipe until construction is complete, at which time the reservoir will be filled.

The reservoir which was constructed in 1878 has been drained a number of times. The last time was in 1958 when the Village of Attica installed a new 10" line to the water treatment plant. The village has no objections to draining the reservoir for this construction.

Water Supply Pipe Line

A 6" pipe line will be installed from the lower Attica reservoir to HCPC Dale Brine Plant. This line will be routed as shown in Figure 1. Stream crossing permits for the A1 classified streams will be requested.

Adequacy of Water Supply

HCPC engaged Woodward-Clyde Consultants, WCC, to make an analysis of the safe yield* from the Crow Creek watershed. WCC concluded that the safe yield from the combined existing reservoir system is in the range of 3.0 to 3.4 million gallons per day (mgd). Average daily demand by the Village of Attica water treatment plant approximates 0.89 mgd with projected demand of 1.05 mgd by the year 2020. Based on this data, the water shed has an excess safe yield of approximately 1.95 to 2.35 mgd. HCPC plans to use 0.5 mgd of this excess flow.

The Village of Attica takes its water from the upper two reservoirs (see Figure 2). The lower reservoir that HCPC will draw water from is below the village water supply and is no longer used by the Village.

Adequacy of Water Supply (continued)

The Village of Attica employed Nussbaumer & Clarke Inc. to review the WCC report and have satisfied themselves on the adequacy of the water supply. The water contract between HCPC and the Village includes a clause that if the water level reaches a low point in Reservoir No. 3 that no more water will be taken by HCPC until the level reaches a safe point. HCPC will be supplied with water only after the Village needs are met.

Fish In Reservoir & Crow Creek

The water in the lower reservoir is stagnant and supports only small fish. The upper two reservoirs have in previous years been stocked with fish but as of last summer all three reservoirs have been posted for no fishing and no trespassing by the Village. This was done to protect the Village water supply from possible contamination from activities around the reservoirs.

No flow data is available for Crow Creek but local citizens report that there normally is a continuous flow downstream of the reservoir system. Because of the steep rocky slope of the creek there are few fish in the creek of any significant size. On occasion water has not been released from the upper reservoir and water has stopped flowing over the lower reservoir spillway. To our knowledge this doesn't happen very often. For HCPC operation to be successful, water will have to be released from the upper reservoir more consistently which will insure a flow over the lower reservoir spillway.

Draining the lower reservoir will have little effect on the fish in the reservoir as they will be swept down the creek to the Tonawanda Creek. A constant flow of water will flow through the drained reservoir to the creek during the construction period.

L L Dirickson 3/8/77

L.L. Dirickson, P.E.

*Safe yield - amount of water that can be annually withdrawn from a basin without producing undesired results, generally considered to be the lowest yield on record or the projected 100 year drought)

Attachments:

Figure No. 1 USGS Map showing proposed water pipeline
Figure No. 2 Schematic of Crow Creek water system

CROW CREEK WATER SHED
WATER MANAGEMENT SYSTEM

Purpose

The water management system described will enable the water flow through the three Attica Reservoirs on Crow Creek to be monitored and controlled so that the available water may be efficiently used. The instrumentation and equipment is designed to conserve the water in Reservoir #3 and to record the water flow through the system. The attached schematic-flow diagram, Drawing A-160-S97, and the discussion below, describes the water management system.

Discussion

To make full use of the available storage capacity of Reservoir #3, the water in this reservoir should be released only when required. An automatic valve will be installed in the outlet pipe from Reservoir #3 that is operable from the water treatment plant office by adjusting a knob equipped with a valve position indicator. By operating this valve the water treatment plant operator can maintain the water level in Reservoir #1 between one foot and three feet below the spillway. The expected maximum position of the automatic valve will be approximately 40% open. This setting will supply the water requirements of the water treatment plant, HCPC and the minimum creek flow. The water level of Reservoirs #1 and #3 will be recorded on a common chart in the water treatment plant office.

Description

The water management system consists of two stream flow gauging stations with recorders, an automatic valve at Reservoir #3, a minimum flow orifice at Reservoir #1, a precipitation gauge and instrumentation to operate the automatic valve, to record the levels in Reservoirs #1 and #3 and to indicate and totalize the water used by HCPC.

One stream flow gauging station will be located on Village property downstream of Reservoir #3 east of Nesbit (Baker) Road per Drawing A-11-12687. The second stream flow gauging station will be located on Village property downstream of Reservoir #1 near Dunbar Road per Drawing A-11-12689. The precipitation gauge will be the one now located and used at the water treatment plant.

Description (Continued)

The instrumentation required to operate the automatic valve, record the two reservoir levels and the flow indicator/totalizer for water used by HCPC will be located in the water treatment plant office. The attached purchase orders describe these instruments.

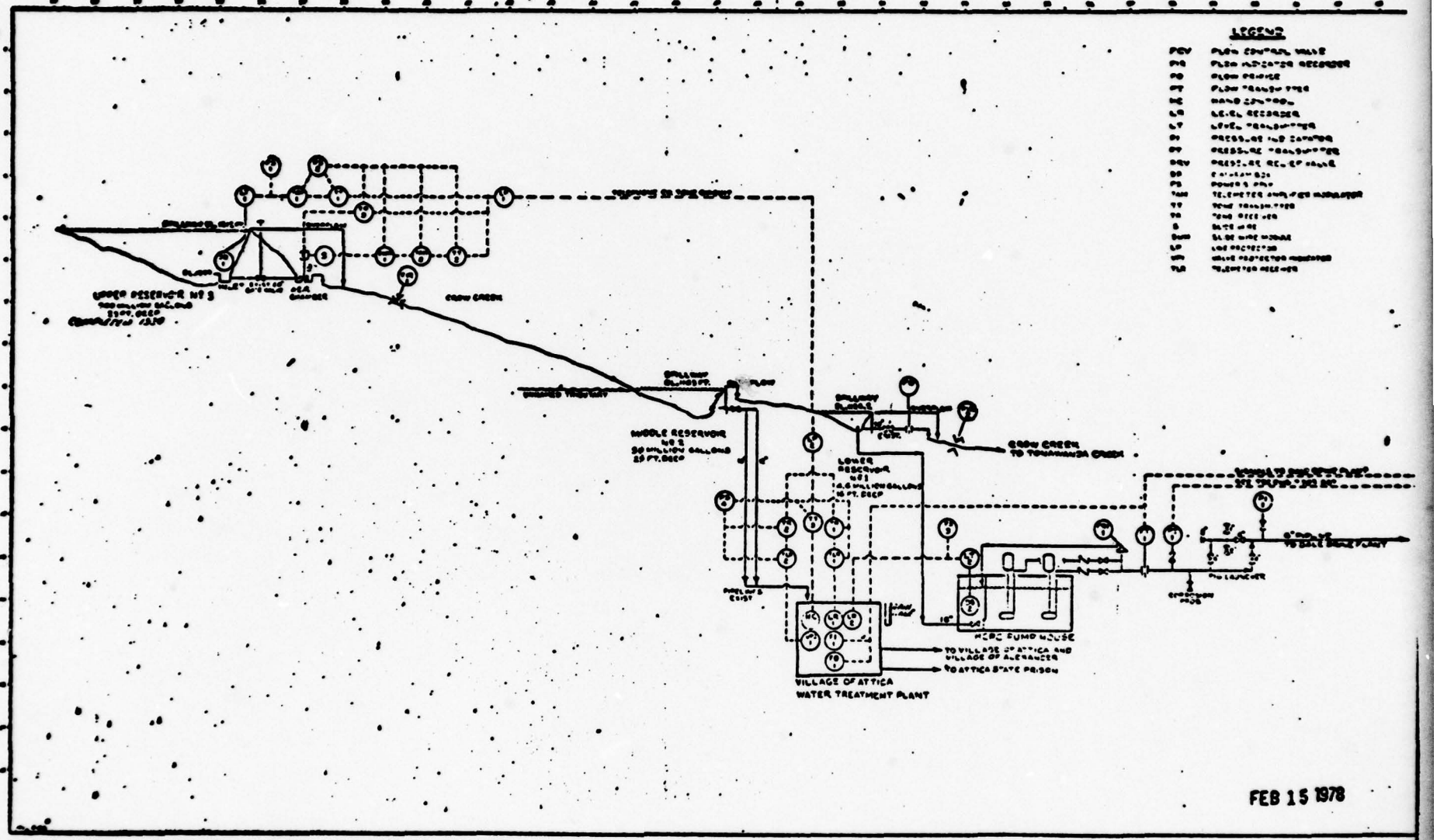
The minimum creek flow downstream of Reservoir #1 will be obtained through an orifice set in the 30" outlet from this Reservoir and the minimum creek flow downstream of Reservoir #3 will be obtained by installing the automatic valve so it cannot close completely. Closed position will be approximately 10% open. Drawing A-11-12686 presents the details for mounting the orifice in the 30" outlet of Reservoir #1 and for mounting the automatic valve in the 20" outlet from Reservoir #3.

Texas Brine Corp. personnel from the Dale brine plant will be responsible for maintenance on the water management system and for changing the charts on the recorders.

Attachments

A-160-S97	Crow Creek Water Shed - Water Management System Schematic (11"x17" Size)
A-11-12686	Reservoir #1 Min. Flow Orifice and #3 Automatic Valve
A-11-12687	Stream Flow Gauging Station at Reservoir #3 Plot Plan
A-11-12688	Stream Flow Gauging Station at Reservoir #3 Details
A-11-12689	Stream Flow Gauging Station at Reservoir #1
P.O. 838-6378	To AVC Co. for Automatic Valve at Reservoir #3
P.O. 838-6492	To Foxboro for Reservoir Level Instruments, Auto Valve Control Instrument and Flow Indicator
P.O. 838-6497	To RFL Industries for Telemeter Equipment for Signals Between Water Treatment Plant and Reservoir #3

LLD
2-22-78



FEB 15 1978

HOOKER CHEMICAL CORP.
DALE, N.Y.

CROW CREEK WATER SHED —
WATER MANAGEMENT SYSTEM SCHEMATIC

APPENDIX C

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

[redacted]

DESIGN BRIEF

DESIGNED BY JPG DATE 7.6.78

CHECKED BY PAGE C-1 OF

PROJECT NO. 2210 SHORT TITLE NY DAM INSPECTIONS

DESIGN SUBJECT ATTICA DAM REF. DWGS.

ESTIMATOR OF T_c (OPR)

$$T_c = (11.9\ L^3/H)^{.385} = (11.9\ (2.782)^3/295)^{.385} = .926\ Hr$$

SCS

$$L = \frac{P^{0.8}\ (S+1)^{0.7}}{1900\ y^{0.5}} = \frac{(14400)^{.8}\ (3.889+1)^{.7}}{1900\ (5.5)^{0.5}} = \frac{2121.73 \quad 3.027}{}$$

$$= \frac{6443.81}{4455.90} = 1.446$$

$$S = \frac{1000}{CN} - 10 = 3.889$$

$y = 5.5\%$

$$T_c = L/.6 = 1,446/.6 = 2.410$$

North Atlantic Division Water Resources Study February 1972*

$T_c + R = 10\ (a)\ (DA/S)^{.25} = 4.319$

$T_c + R = 10\ (1.07)\ (3.10/85)^{.25} = 4.676$

$R/(T_c+R) = 0.70$

$R = 0.70 \times 4.676 = 3.27$

$T_c = 4.68 - 3.27 = 1.40$

* Project site out of study area. These are estimated values.

$a = 1.07$

Mohawk and Upper Hudson Report, N.Y. Dist 1977*

$(T_c+R) = 7.52\ A^{0.215} \times ST^{0.425}$

$= 7.52 \times 3^{0.215} \times 1.08^{0.425} = 9.87$

$R = 3.30\ A^{0.195} \times ST^{0.715} = 4.16$ hours

$T_c = 9.87 - 4.16 = 5.70$ hours

* Also out of project area. Both Buffalo District unable to provide any relationships for these determinations.

A = drainage area (mi²)

ST = % water

DALE

DESIGN BRIEF

DESIGNED BY N.D. DATE 7-7-78

CHECKED BY PAGE C-2 OF

PROJECT NO. 2216 SHORT TITLE NY DAM INSPECTIONS

DESIGN SUBJECT Attica Dam REF. DWGS.

SUMMARY OF ESTIMATES OF CLARK PARAMETERS

BPR - T_c = 0.93 hours

SCS (CN method) T_c = 2.41 hours

North Atlantic Div.

Study, 1972 T_c = 1.40 hours

Mohawk & Upper Hudson

Report T_c = 5.70 hours

Use North Atlantic Div. Results for T_c and R Estimate

T_c = 1.40 hours

R = 3.27 hours

DALE

DESIGN BRIEF

DESIGNED BY N. D. DATE 1-1-78

CHECKED BY PAGE C-3 OF

PROJECT NO. 2210 SHORT TITLE N. Y. Dam Inspection

DESIGN SUBJECT Attica Dam REF. DWGS.

D - A - D Relationship *

Drainage area less than 10 sq. mi.
therefore use values for 10 sq. mi.

Duration	Depth	% of Index
6 HR	24.0	112
12 HR	27.5	128
24 HR	29.5	137
48 HR	32.5	151
72 HR	34.0	158

PMP Indey Rainfall **
21.5

Base Flow

Estimate 2 cubic feet per second per square mile

Base Flow = 2 x 3.1 = 6.2 say 6 cfs

Loss Rates

Initial Loss 1.0 in.
Constant Loss 0.1 in/hr.

* From Hydrometeorological Report No. 51
** Index rainfall - estimate for 24 hour duration for area 200 sq. mi.

DALE

DESIGN BRIEF

DESIGNED BY N.D. DATE 7-12-78

CHECKED BY PAGE C-4 OF

PROJECT NO. SHORT TITLE N.Y. Dam Inspection

DESIGN SUBJECT Attica Dam REF. DWGS.

UHCOMP Computer Runs

(Prior to Routing Thru Spillway)

RUN NO.	DESCRIPTION	PEAK	PAGE
1	PMF	5400	5-6
2	SPF	2800	7-9

```
SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)      1
ENTER TIME INTERVAL(MIN)=    60.

SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)      2
ENTER DRAINAGE AREA (SQMI) =       3.10
SELECT 1-3 (1=INPUT UH, 2=CLARK, 3=SNYDER )       2
ENTER NUMBER OF TIME-AREA ORDINATES (0=NONE)=     0
ENTER CLARKS TC AND R (HRS) =         1.40       3.27

      TP        CP       TC        R

    1.70    0.356     1.40     3.27

SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)      3
ENTER RATIO  IMPERVIOUS =         0.00
SELECT 1-3 ( 1=RAIN, 2=SFS, 3=PMS )       3
ENTER PMS INDEX RAINFALL (IN) = 21.50
ENTER R6,R12,R24,R48,R72,R96 =     112.00  128.00  137.00  151.00  158.00     0.00
ENTER TRSPC AND TRSDA (SQMI) =            0.00       3.10
SELECT 1-3 (1=INIT+CONST, 2=ACUM LOSS, 3=SCS)       1
ENTER INITIAL LOSS(IN), CONSTANT LOSS(IN/HR) =      1.00       0.10

SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)      4
ENTER A TITLE PLEASE -   ATTICA DAM#3 PMF
ENTER STRTQ,QRCSN,AND RTIOR =         6.00     6.00     1.00

 HR MIN   RAIN  LOSS EXCESS  UNIT HG    RECSN     FLOW
  1   0  0.01  0.01  0.00      208.       6.        6.
  2   0  0.01  0.01  0.00      418.       6.        6.
  3   0  0.01  0.01  0.00      365.       6.        6.
  4   0  0.01  0.01  0.00      268.       6.        6.
  5   0  0.01  0.01  0.00      197.       6.        6.
  6   0  0.01  0.01  0.00      145.       6.        6.
  7   0  0.04  0.04  0.00      107.       6.        6.
  8   0  0.04  0.04  0.00       79.       6.        6.
  9   0  0.04  0.04  0.00       58.       6.        6.
 10   0  0.04  0.04  0.00       43.       6.        6.
 11   0  0.04  0.04  0.00       31.       6.        6.
 12   0  0.04  0.04  0.00       23.       6.        6.
 13   0  0.19  0.19  0.00       17.       6.        6.
 14   0  0.22  0.22  0.00       13.       6.        6.
 15   0  0.28  0.28  0.00       10.       6.        6.
 16   0  0.70  0.11  0.59        7.       6.      129.
 17   0  0.26  0.10  0.16        5.       6.      286.
 18   0  0.20  0.10  0.10        4.       6.      309.
 19   0  0.01  0.01  0.00                 6.      264.
 20   0  0.01  0.01  0.00                 6.      202.
 21   0  0.01  0.01  0.00                 6.      150.
 22   0  0.01  0.01  0.00                 6.      112.
 23   0  0.01  0.01  0.00                 6.       84.
 24   0  0.01  0.01  0.00                 6.       63.
 25   0  0.10  0.10  0.00                 6.       48.
 26   0  0.10  0.10  0.00                 6.       37.
 27   0  0.10  0.10  0.00                 6.       29.
 28   0  0.10  0.10  0.00                 6.       23.
 29   0  0.10  0.10  0.00                 6.       19.
 30   0  0.10  0.10  0.00                 6.       15.
 31   0  0.43  0.10  0.33                 6.       82.
 32   0  0.43  0.10  0.33                 6.      218.
```

53	0	0.43	0.10	0.33		6.	337.
54	0	0.43	0.10	0.33		6.	423.
55	0	0.43	0.10	0.33		6.	487.
56	0	0.43	0.10	0.33		6.	535.
57	0	1.82	0.10	1.72		6.	859.
58	0	2.10	0.10	2.00		6.	1541.
59	0	2.72	0.10	2.62		6.	2330.
60	0	0.90	0.10	0.80		6.	3944.
61	0	2.54	0.10	2.44		6.	5364.
62	0	2.00	0.10	1.90		6.	5378.
63	0	0.15	0.10	0.05		6.	4610.
64	0	0.15	0.10	0.05		6.	3524.
65	0	0.15	0.10	0.05		6.	2620.
66	0	0.15	0.10	0.05		6.	1956.
67	0	0.15	0.10	0.05		6.	1468.
68	0	0.15	0.10	0.05		6.	1109.
69	0	0.00	0.00	0.00		6.	834.
70	0	0.00	0.00	0.00		6.	619.
71	0	0.00	0.00	0.00		6.	458.
72	0	0.00	0.00	0.00		6.	340.
73	0	0.00	0.00	0.00		6.	252.
74	0	0.00	0.00	0.00		6.	188.
75	0	0.02	0.02	0.00		6.	137.
76	0	0.02	0.02	0.00		6.	98.
77	0	0.02	0.02	0.00		6.	67.
78	0	0.02	0.02	0.00		6.	31.
79	0	0.02	0.02	0.00		6.	18.
80	0	0.02	0.02	0.00		6.	9.
81	0	0.09	0.09	0.00		6.	8.
82	0	0.11	0.10	0.01		6.	9.
83	0	0.14	0.10	0.04		6.	19.
84	0	0.35	0.10	0.25		6.	79.
85	0	0.13	0.10	0.03		6.	134.
86	0	0.10	0.10	0.00		6.	122.
87	0	0.01	0.01	0.00		6.	93.
88	0	0.01	0.01	0.00		6.	70.
89	0	0.01	0.01	0.00		6.	53.
90	0	0.01	0.01	0.00		6.	41.
91	0	0.01	0.01	0.00		6.	32.
92	0	0.01	0.01	0.00		6.	25.
93	0					6.	20.
94	0					6.	16.
95	0					6.	14.
96	0					6.	12.
97	0					6.	10.
98	0					6.	9.
99	0					6.	8.
00	0					6.	8.
01	0					6.	7.
02	0					6.	6.
03	0					6.	6.
04	0					6.	6.
05	0					6.	6.
06	0					6.	6.
07	0					6.	6.
08	0					6.	6.
09	0					6.	6.
TOTAL		25.55	4.53	21.02	1998.	534.	42533.

```
SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)      1
ENTER TIME INTERVAL(MIN)=    6C.


SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)      2
ENTER DRAINAGE AREA (SQMI) =       3.10
SELECT 1-3 (1=INPUT UH, 2=CLARK, 3=SNYDER )        2
ENTER NUMBER OF TIME-AREA ORDINATES (0=NONE)=      0
ENTER CLARKS TC AND R (HRS) =          1.40        3.27

      TP        CP        TC        R

    1.70     0.356      1.40      3.27


SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)      3
ENTER RATIO  IMPERVIOUS =          0.00
SELECT 1-3 ( 1=RAIN, 2=SPS, 3=PMS )        2
ENTER SPS INDEX RAINFALL (IN) = 10.75
ENTER TRSPC AND TRSDA (SQMI) =             1.00        3.10
SELECT 1-3 (1=INIT+CONST, 2=ACUM LOSS, 3=SCS)        1
ENTER INITIAL LOSS(IN), CONSTANT LOSS(IN/HR) =       1.00        0.10


SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP)      4
ENTER A TITLE PLEASE -   ATTICA DAM#3 SPF
ENTER STRTQ,QRCSN,AND RTIOR =          6.00     61.00      6.00

 HR MIN   RAIN   LOSS EXCESS  UNIT HG    RECSN     FLOW
  1   0   0.00   0.00   0.00      208.       5.        5.
  2   0   0.00   0.00   0.00      416.       4.        4.
  3   0   0.00   0.00   0.00      365.       4.        4.
  4   0   0.00   0.00   0.00      268.       3.        3.
  5   0   0.00   0.00   0.00      197.       2.        2.
  6   0   0.00   0.00   0.00      145.       2.        2.
  7   0   0.01   0.01   0.00      107.       2.        2.
  8   0   0.01   0.01   0.00       79.       1.        1.
  9   0   0.01   0.01   0.00       58.       1.        1.
 10   0   0.01   0.01   0.00       43.       1.        1.
 11   0   0.01   0.01   0.00       31.       1.        1.
 12   0   0.01   0.01   0.00       23.       1.        1.
 13   0   0.03   0.03   0.00       17.       1.        1.
 14   0   0.03   0.03   0.00       13.       0.        0.
 15   0   0.04   0.04   0.00       10.       0.        0.
 16   0   0.11   0.11   0.00        7.       0.        0.
 17   0   0.04   0.04   0.00        5.       0.        0.
 18   0   0.03   0.03   0.00        4.       0.        0.
 19   0   0.00   0.00   0.00                 0.        0.
 20   0   0.00   0.00   0.00                 0.        0.
 21   0   0.00   0.00   0.00                 0.        0.
 22   0   0.00   0.00   0.00                 0.        0.
 23   0   0.00   0.00   0.00                 0.        0.
 24   0   0.00   0.00   0.00                 0.        0.
 25   0   0.01   0.01   0.00                 0.        0.
 26   0   0.01   0.01   0.00                 0.        0.
 27   0   0.01   0.01   0.00                 0.        0.
 28   0   0.01   0.01   0.00                 0.        0.
 29   0   0.01   0.01   0.00                 0.        0.
 30   0   0.01   0.01   0.00                 0.        0.
```

31	0	0.05	0.05	0.00	0.	0.
32	0	0.03	0.03	0.00	0.	0.
33	0	0.03	0.03	0.00	0.	0.
34	0	0.03	0.03	0.00	0.	0.
35	0	0.03	0.03	0.00	0.	0.
36	0	0.03	0.03	0.00	0.	0.
37	0	0.13	0.13	0.00	0.	0.
38	0	0.15	0.15	0.00	0.	0.
39	0	0.19	0.17	0.02	0.	4.
40	0	0.48	0.10	0.38	0.	87.
41	0	0.18	0.10	0.08	0.	183.
42	0	0.14	0.10	0.04	0.	186.
43	0	0.02	0.02	0.00	0.	152.
44	0	0.02	0.02	0.00	0.	114.
45	0	0.02	0.02	0.00	0.	84.
46	0	0.02	0.02	0.00	0.	62.
47	0	0.02	0.02	0.00	0.	51.
48	0	0.02	0.02	0.00	0.	43.
49	0	0.08	0.08	0.00	0.	36.
50	0	0.08	0.08	0.00	0.	30.
51	0	0.08	0.08	0.00	0.	25.
52	0	0.08	0.08	0.00	0.	21.
53	0	0.08	0.08	0.00	0.	18.
54	0	0.08	0.08	0.00	0.	15.
55	0	0.26	0.10	0.16	0.	37.
56	0	0.26	0.10	0.16	0.	103.
57	0	0.26	0.10	0.16	0.	161.
58	0	0.26	0.10	0.16	0.	202.
59	0	0.26	0.10	0.16	0.	233.
60	0	0.26	0.10	0.16	0.	256.
61	0	0.98	0.10	0.88	0.	423.
62	0	1.17	0.10	1.07	0.	776.
63	0	1.47	0.10	1.37	0.	1190.
64	0	3.71	0.10	3.61	0.	2051.
65	0	1.37	0.10	1.27	0.	2809.
66	0	1.07	0.10	0.97	0.	2811.
67	0	0.16	0.10	0.06	0.	2409.
68	0	0.16	0.10	0.06	0.	1856.
69	0	0.16	0.10	0.06	0.	1397.
70	0	0.16	0.10	0.06	0.	1059.
71	0	0.16	0.10	0.06	0.	812.
72	0	0.16	0.10	0.06	0.	630.
73	0	0.00	0.00	0.00	0.	483.
74	0	0.00	0.00	0.00	0.	359.
75	0	0.00	0.00	0.00	0.	265.
76	0	0.00	0.00	0.00	0.	195.
77	0	0.00	0.00	0.00	0.	144.
78	0	0.00	0.00	0.00	0.	107.
79	0	0.01	0.01	0.00	0.	77.
80	0	0.01	0.01	0.00	0.	64.
81	0	0.01	0.01	0.00	0.	54.
82	0	0.01	0.01	0.00	0.	45.
83	0	0.01	0.01	0.00	0.	38.
84	0	0.01	0.01	0.00	0.	31.
85	0	0.05	0.05	0.00	0.	26.

86	0	0.06	0.06	0.00		0.	22.
87	0	0.07	0.07	0.00		0.	18.
88	0	0.19	0.10	0.09		0.	19.
89	0	0.07	0.07	0.00		0.	38.
90	0	0.05	0.05	0.00		0.	33.
91	0	0.01	0.01	0.00		0.	27.
92	0	0.01	0.01	0.00		0.	23.
93	0	0.01	0.01	0.00		0.	19.
94	0	0.01	0.01	0.00		0.	16.
95	0	0.01	0.01	0.00		0.	13.
96	0	0.01	0.01	0.00		0.	11.
97	0					0.	9.
98	0					0.	8.
99	0					0.	7.
100	0					0.	5.
101	0					0.	5.
102	0					0.	4.
103	0					0.	3.
104	0					0.	3.
105	0					0.	2.
106	0					0.	2.
107	0					0.	2.
108	0					0.	1.
109	0					0.	1.
110	0					0.	1.
111	0					0.	1.
112	0					0.	1.
113	0					0.	1.
TOTAL		15.35	4.25	11.10	1998.	31.	22539.

ATTICA (PRINC SPILLWAY)

DIAMETER OF PIPE (FT) 1.67
START ELEV OF PIPE (FT) 1586.00
ROUGH COEFFICIENT 0.0140
HEIGHT-HEAD (FT) 45.00
PIPE LENGTH (FT) 173.00

KT,KO,KENT,KEXT 4.24 3.14 0.10 1.00

C 0.480

ELEV	HEIGHT	2gH	(2gH)**1/2	C/C	Q
1587	1.00	64.40	8.02	17.58	8.54
1588	2.00	128.80	11.35	24.86	12.07
1589	3.00	193.20	13.90	30.45	14.79
1590	4.00	257.60	16.05	35.16	17.07
1591	5.00	322.00	17.94	39.31	19.09
1592	6.00	386.40	19.66	43.06	20.91
1593	7.00	450.80	21.23	46.51	22.58
1594	8.00	515.20	22.70	49.72	24.14
1595	9.00	579.60	24.07	52.73	25.61
1596	10.00	644.00	25.38	55.59	26.99
1597	11.00	708.40	26.62	58.30	28.31
1598	12.00	772.80	27.80	60.89	29.57
1599	13.00	837.20	28.93	63.38	30.78
1600	14.00	901.60	30.03	65.77	31.94
1601	15.00	966.00	31.08	68.08	33.06
1602	16.00	1030.40	32.10	70.31	34.14
1603	17.00	1094.80	33.09	72.48	35.20
1604	18.00	1159.20	34.05	74.58	36.22
1605	19.00	1223.60	34.98	76.62	37.21
1606	20.00	1288.00	35.89	78.61	38.18
1607	21.00	1352.40	36.77	80.55	39.12
1608	22.00	1416.80	37.64	82.45	40.04
1609	23.00	1481.20	38.49	84.30	40.94
1610	24.00	1545.60	39.31	86.11	41.82
1611	25.00	1610.00	40.12	87.89	42.68
1612	26.00	1674.40	40.92	89.63	43.53
1613	27.00	1738.80	41.70	91.34	44.36
1614	28.00	1803.20	42.46	93.01	45.17
1615	29.00	1867.60	43.22	94.66	45.97
1616	30.00	1932.00	43.95	96.28	46.75
1617	31.00	1996.40	44.68	97.87	47.53
1618	32.00	2060.80	45.40	99.44	48.29
1619	33.00	2125.20	46.10	100.98	49.04
1620	34.00	2189.60	46.79	102.50	49.77
1621	35.00	2254.00	47.48	103.99	50.50
1622	36.00	2318.40	48.15	105.47	51.22
1623	37.00	2382.80	48.81	106.92	51.92
1624	38.00	2447.20	49.47	108.36	52.62
1625	39.00	2511.60	50.12	109.77	53.31
1626	40.00	2576.00	50.75	111.17	53.99
1627	41.00	2640.40	51.38	112.55	54.66
1628	42.00	2704.80	52.01	113.92	55.32
1629	43.00	2769.20	52.62	115.27	55.98
1630	44.00	2833.60	53.23	116.60	56.62
1631	45.00	2898.00	53.83	117.92	57.26

ATTICA
WEIR FLOW PROGRAM

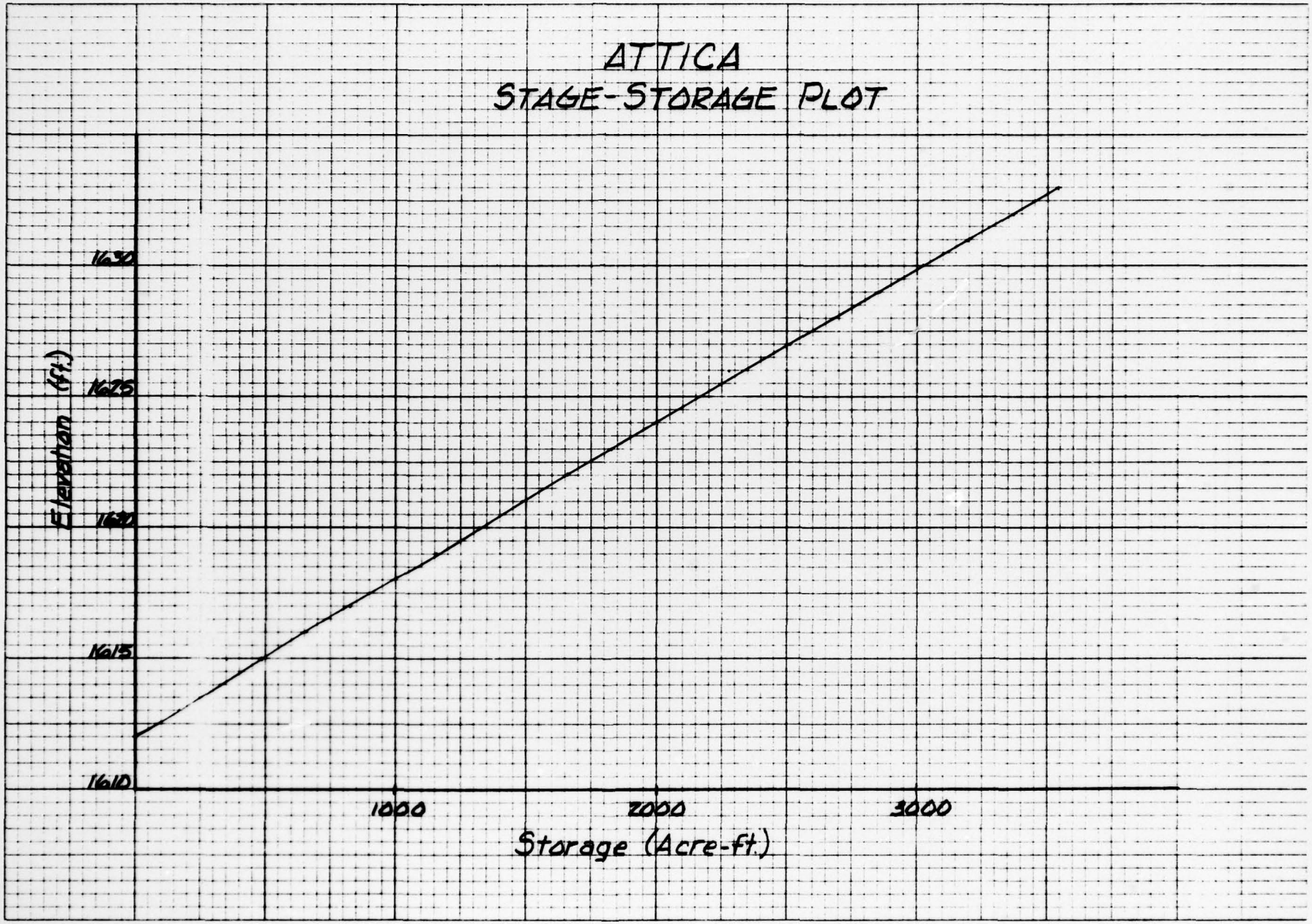
GIVE C,L 3.66 15.00
GIVE ELEVATION TO START FLOW AND WEIGHT 1612 2L

ELEV	1613 FT	DISCHARGE	54. CFS
ELEV	1614 FT	DISCHARGE	153. CFS
ELEV	1615 FT	DISCHARGE	281. CFS
ELEV	1616 FT	DISCHARGE	432. CFS
ELEV	1617 FT	DISCHARGE	604. CFS
ELEV	1618 FT	DISCHARGE	794. CFS
ELEV	1619 FT	DISCHARGE	1000. CFS
ELEV	1620 FT	DISCHARGE	1222. CFS
ELEV	1621 FT	DISCHARGE	1458. CFS
ELEV	1622 FT	DISCHARGE	1708. CFS
ELEV	1623 FT	DISCHARGE	1970. CFS
ELEV	1624 FT	DISCHARGE	2245. CFS
ELEV	1625 FT	DISCHARGE	2531. CFS
ELEV	1626 FT	DISCHARGE	2829. CFS
ELEV	1627 FT	DISCHARGE	3137. CFS
ELEV	1628 FT	DISCHARGE	3456. CFS
ELEV	1629 FT	DISCHARGE	3785. CFS
ELEV	1630 FT	DISCHARGE	4124. CFS
ELEV	1631 FT	DISCHARGE	4472. CFS
ELEV	1632 FT	DISCHARGE	4830. CFS

ATTICA
WEIR FLOW PROGRAM

GIVE C,L 2.64 462.00
GIVE ELEVATION TO START FLOW AND HEIGHT 1618 14

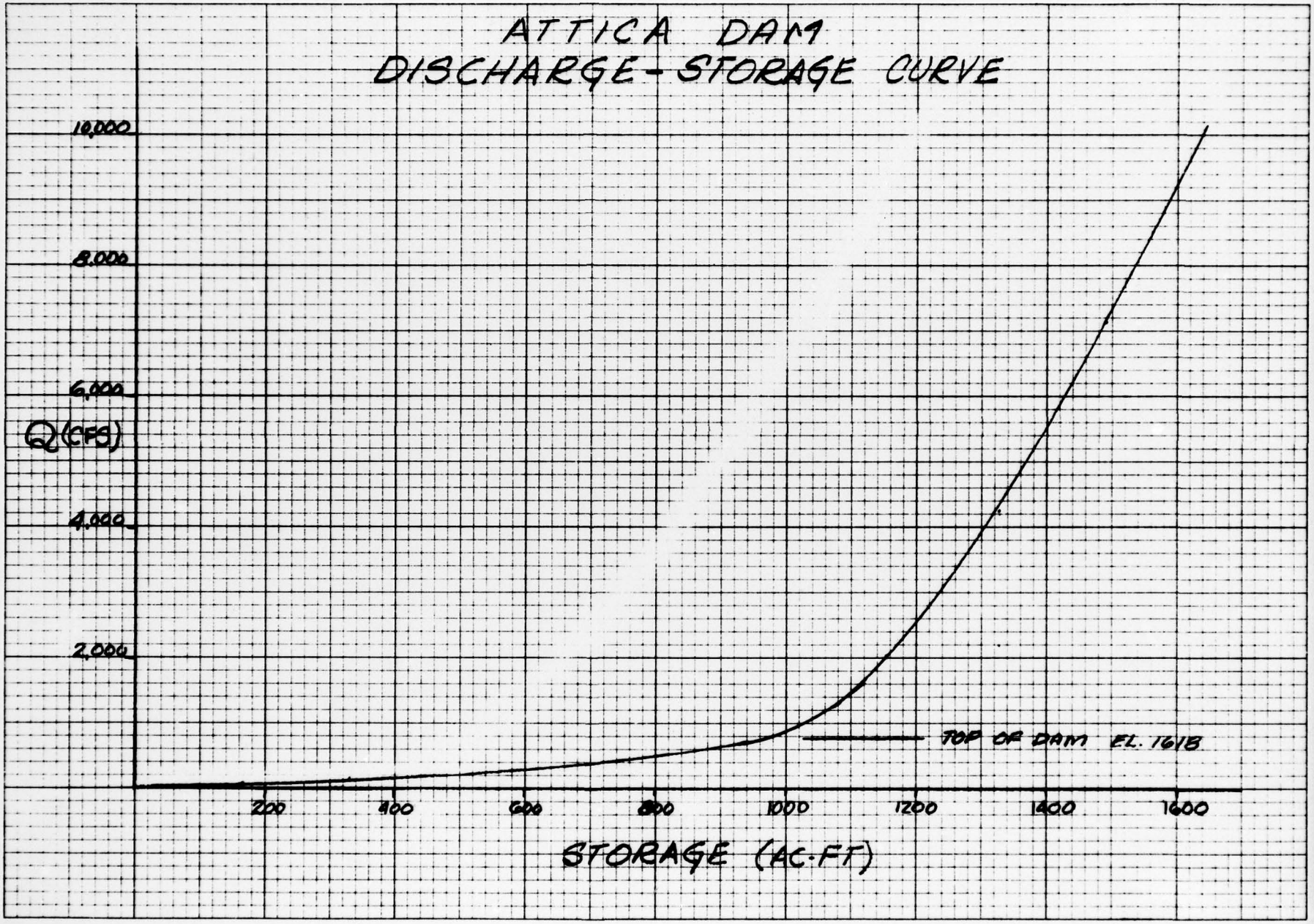
ELEV	1619 FT	DISCHARGE	1220. CFS
ELEV	1620 FT	DISCHARGE	3450. CFS
ELEV	1621 FT	DISCHARGE	6338. CFS
ELEV	1622 FT	DISCHARGE	9757. CFS
ELEV	1623 FT	DISCHARGE	13636. CFS
ELEV	1624 FT	DISCHARGE	17926. CFS
ELEV	1625 FT	DISCHARGE	22589. CFS
ELEV	1626 FT	DISCHARGE	27598. CFS
ELEV	1627 FT	DISCHARGE	32931. CFS
ELEV	1628 FT	DISCHARGE	38570. CFS
ELEV	1629 FT	DISCHARGE	44497. CFS
ELEV	1630 FT	DISCHARGE	50701. CFS
ELEV	1631 FT	DISCHARGE	57169. CFS
ELEV	1632 FT	DISCHARGE	63891. CFS



FROM CREST OF SPILLWAY

NAME	ELEV.	H	Q * PRINC SPWY	Q EMERG. SPWY	Q DAM	Q TOT.
ATTICA	1612	—	43.53	———	—	—
	1613	1	44.36	54	—	54
	1614	2	45.17	153	—	153
	1615	3	45.97	281	—	281
	1616	4	46.75	432	—	432
	1617	5	47.53	604	—	604
TOP DAM	1618	6	48.29	794	—	794
	1619	7	49.04	794	1220	2014
	1620	8	49.77	794	3450	4244
	1621	9	50.50	794	6338	7132
	1622	10	51.22	794	9757	10,551
	1623	11	51.92	794	13,636	14,430
	1624	12	52.62	794	17,926	18,720
	1625	13	53.31	794	22589	23383
	1626	14	53.99	794	27598	28392
	1627	15	54.66	794	32931	33725
	1628	16	55.32	794	38570	39364
	1629	17	55.98	794	44497	45291
	1630	18	56.62	794	50701	51495
	1631	19	57.26	794	57169	57963
	1632	20		794	63891	64685

* PIPE SPILLWAY MANUALLY OPERATED AND ASSUMED NOT ACTING IN THIS TABULATION.



S1-2

```
#LNNFF
00100 A ATTICA DAM
0110 A RESERVOIR ROUTING OF PMF OVER STRUCTURE
0120 A INCLUDES EMERGENCY SPILLWAY ONLY
0130 B     30         1
0140 1      3
0150 K
0160 N     -1              3.1          0
0170 N     15        82    218    337    423    487    535    859   1541   2330
0180 N   3944      5364   5370   4610   3520   2620   1956   1460   1109    830
0190 N    619       450    340    252    180    137     98     67     31     18
0200 K                1
0210 Y                              1
0220 1      1                                          -1
0230 2           164.   328.   493.   658.   824.   990.  1157.  1324.  1491.
00240 3           54.   153.   281.   432.   604.   794.  2014.  4244.  7132.
0250 K     99
0260 A
0270 A
0280 A
#OLD NY445S
#LNNFF
00100 A ATTICA DAM
0110 A RESERVOIR ROUTING OVER STRUCTURE FOR SPF
0120 A INCLUDES EMERGENCY SPILLWAY ONLY
0130 B     33         1
0140 1      3
0150 K
0160 N     -1              3.1
0170 N     15        37    103    161    202    233    256    423    734   1190
0180 N   2051      2809   2811   2409   1856   1397   1059    812    630    483
0190 N    359       265    195    144    144     77     64     54     45     38
0200 N     31        24     22
0210 K                1
0220 Y                              1
0230 1      1                                          -1
0240 2           164.   328.   493.   658.   824    990.  1157.  1324.  1491.
0250 3            54.   153.   281.0  432.   604.   794.  2014.  4244.  7132.
0260 K     99
0270 A
0280 A
0290 A
#
```

****
EC-1 VERSION DATED JAN 1973
PRATED AUG 74
RANGE NO. 01
****

ATTICA DAM
RESERVOIR ROUTING OF PMF OVER STRUCTURE
INCLUDES EMERGENCY SPILLWAY ONLY

JOB SPECIFICATION

NQ	NMR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	MSTAN
36	1	0	0	0	0	0	0	0	0

JOPER	NWT
3	0

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
0	0	0	0	0	0	0

HYDROGRAPH DATA

IHYDC	IUNC	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISAME	ISAME	LOCAL
-1	0	3.10	0.0	0.0	0.0	0.0	0	0	0

INPUT HYDROGRAPH

15.	82.	218.	397.	423.	487.	535.	859.	1541.	2336.
3944.	5364.	5370.	4610.	3524.	2620.	1956.	1460.	1109.	83.
619.	458.	340.	252.	188.	137.	98.	67.	31.	18.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	5370.	4240.	1616.	1383.	39891.
INCHES		12.72	19.39	19.55	19.55
AC-FT		2184.	3287.	3232.	3232.

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HYDROGRAPH ROUTING

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
0	1	0	0	0	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME
0.0	0.0	0.0	1	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA
1	0	0	0.0	0.0	0.0	-1.

STORAGE	0.	164.	328.	493.	658.	824.	990.	1157.	1324.	1491.
OUTFLOW	0.	54.	153.	281.	432.	604.	794.	2014.	4244.	7132.

TIME	EXP STOR	AVG IN	EXP OUT
1	46.	15.	15.
2	48.	49.	16.
3	59.	158.	19.
4	80.	278.	26.
5	109.	388.	36.
6	143.	455.	47.
7	181.	511.	64.
8	232.	697.	95.
9	321.	1288.	149.
10	464.	1936.	259.
11	693.	3137.	469.
12	1017.	4454.	995.
13	1273.	5371.	3563.
14	1347.	4994.	4639.
15	1319.	4867.	4174.
16	1268.	3872.	3398.
17	1201.	2288.	2686.
18	1153.	1712.	1986.
19	1109.	1289.	1662.
20	1041.	596.	1168.
21	989.	351.	793.
22	969.	339.	778.
23	948.	399.	737.
24	905.	296.	697.
25	867.	228.	654.
26	829.	163.	609.
27	798.	118.	568.
28	751.	83.	529.
29	713.	49.	489.
30	676.	25.	451.
SUM			31675.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4639.	3393.	1313.	1056.	31675.
INCHES		10.10	15.76	15.84	15.84
AC-FT		1683.	2606.	2619.	2619.

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RUNOFF SUMMARY, AVERAGE FLOW

		PEAK	6-HOUR	24-HOUR	72-HOUR	AREA
HYDROGRAPH AT	0	5378.	4248.	1616.	1303.	3.10
ROUTED TO	0	4439.	3393.	1313.	1056.	3.10

****
EC-1 VERSION DATED JAN 1973
PDATED AUG 74
HANGE NO. 01
****

ATTICA DAM
RESERVOIR ROUTING OF SPF OVER STRUCTURE
INCLUDES EMERGENCY SPILLWAY ONLY

JOB SPECIFICATION

NR	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
33	1	0	0	0	0	0	0	0	0

JOPER	NWT
3	0

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SUB-AREA RUNOFF COMPUTATION

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
0	0	0	0	0	0	0

HYDROGRAPH DATA

IHYDG	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
-1	0	3.10	0.0	0.0	0.0	0.0	0	0	0

INPUT HYDROGRAPH

15.	37.	103.	161.	282.	233.	256.	423.	736.	1190.
2051.	2809.	2811.	2409.	1856.	1397.	1059.	812.	636.	483.
359.	265.	195.	144.	107.	77.	64.	54.	45.	38.
31.	26.	22.							

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2811.	2222.	965.	639.	21100.
INCHES		6.67	10.39	10.55	10.55
AC-FT		1102.	1717.	1745.	1745.

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HYDROGRAPH ROUTING

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
0	1	0	0	0	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME
0.0	0.0	0.0	1	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA
1	0	0	0.0	0.0	0.0	-1.

[illegible]	0.	164.	328.	493.	658.	824.	990.	1157.	1324.	1491.
[illegible]	0.	54.	153.	281.	432.	604.	794.	2014.	4284.	713200.

TIME	EOP STOR	AVG IN	EOP OUT
1	46.	15.	15.
2	46.	26.	15.
3	51.	70.	17.
4	60.	132.	20.
5	73.	102.	24.
6	89.	218.	29.
7	107.	245.	35.
8	132.	340.	43.
9	175.	500.	61.
10	248.	963.	105.
11	370.	1621.	185.
12	549.	2430.	333.
13	746.	2810.	523.
14	911.	2610.	704.
15	1017.	2133.	993.
16	1057.	1627.	1207.
17	1054.	1228.	1240.
18	1033.	936.	1109.
19	1009.	721.	929.
20	984.	557.	787.
21	935.	421.	754.
22	920.	312.	714.
23	882.	230.	670.
24	842.	170.	625.
25	803.	126.	582.
26	764.	92.	542.
27	727.	71.	503.
28	691.	59.	467.
29	658.	50.	432.
30	627.	42.	404.
31	598.	35.	377.
32	570.	29.	351.
33	544.	24.	328.
SUM			15222.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1287.	1061.	623.	461.	15222.
INCHES		3.18	7.48	7.61	7.61
AC-FT		526.	1237.	1259.	1259.

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RUNOFF SUMMARY, AVERAGE FLOW

		PEAK	6-HOUR	24-HOUR	72-HOUR	AREA
HYDROGRAPH AT	0	2811.	2222.	865.	639.	3.18
ROUTED TO	0	1287.	1061.	623.	461.	3.18

APPENDIX D

REFERENCES

APPENDIX

REFERENCES

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